



Some Basic Lessons in Risk Management

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All businesses face a number of risks including production risk, price risk, input price risk, uncertainty in government policy and regulation, and labor risk. Social scientists, particularly agricultural and business economists, have produced a wealth of research on how to identify, analyze, and manage risk. How can this research be useful to farmers and agribusiness managers? This fact sheet highlights some key lessons.

Basic Concepts

Before highlighting the key lessons, a few important concepts need to be introduced.

First, economists use the term *risk preferences* to describe someone's tolerance for risk. A firm or person who is completely indifferent to risk and only cares about maximizing profits is said to be *risk neutral*. A person who dislikes risk and is willing to pay money (i.e. sacrifice some profits) to avoid it is said to be *risk averse*. For example, a large farm that is diversified across several different commodities may be less risk averse than a small farm that produces only one commodity.

Second, it is important to be able to put a financial value on risk and economists often use the term *risk premium* to describe the financial cost of bearing risk. Risk premiums are common in everyday life. For example, the reason why people are willing to hold risky stocks rather than settle for simple savings accounts is because the expected payoffs of stocks over the long term is higher than the expected payoffs from a savings account. The difference in expected payoffs represents the "risk premium" that an investor gets for holding the riskier investment. Sometimes, rather

than receive a risk premium, risk averse people may pay a risk premium to reduce their financial risk. This is called buying insurance.

Third, as a general rule, firms or individuals that are risk neutral tend to have very small risk premiums. They are less likely to purchase insurance and are willing to bear more market risk in order to increase expected profits. Speculators tend to be risk neutral. On the other hand, firms or individuals who are risk averse are willing to sacrifice some expected profits to avoid risk. They tend to buy insurance and gravitate toward less risky investments and business opportunities.

Lesson 1: Don't bear someone else's risk for free and don't expect others to bear your risk for free.

Most people understand this lesson within the insurance context. People are willing to pay insurance premiums in order for others to bear their risks. People are also willing to buy risky assets such as stocks in order to earn a risk premium over a savings account. However, this lesson is often missed when dealing with business partners and employees so that people might fail to adequately account for risk premiums. An important point to keep in mind is that, regardless of the context, there is always a trade off between risk and return.

For instance, when a manager puts an employee on a pay-for-performance plan and performance is not entirely under the control of the employee (e.g. sales), then the manager may have to pay a higher average salary in order to get the employee to buy into the plan. Essentially, the manager is reducing her performance risk exposure while

increasing the employee's. Naturally, it would be appropriate to increase the employee's average salary. If the manager fails to make this risk versus returns adjustment, employees may become disgruntled and some may quit.

Similarly, if a farmer is producing or selling under a production contract, the farmer should accept more risk only when he is compensated for it. If contract A contains a payment schedule that is contingent on many factors (e.g. death loss, feed conversion, fruit color, etc.) whereas contract B offers a flat payment, then your next question should be: does contract A have a higher *expected* payoff? If not, then always accept contract B. This is how you would assess a stock or mutual fund and this is how you should assess your contracts.

Lesson 2: Minimize risk bearing costs by allocating risk to those who are most able to bear them.

The “cost” of risk bearing—the risk premium—varies across individuals. Thus, a rough estimate of risk preferences is needed in order to devise a strategy for dealing with risk. As a general rule, the more risk averse a person is, the larger is the risk premium required to get him to accept more risk. For example, an employee who is a single parent who is cash constrained and has no alternative sources of income is likely to be more risk averse than a young part-time employee who has alternative sources of income (e.g. parents). Thus, you would have to pay the single parent more than you would have to pay the young part-time employee to bear the same level of risk. A large corporate agribusiness that is well diversified across numerous product lines is likely less risk averse than a small farmer who sells only a single commodity. Why does all of this matter? *Because it is very expensive to shift risk from risk neutral parties to risk averse parties.* What implications does this have for managers?

First, this knowledge will enable you to optimize your labor management strategy. For example, if you are considering implementing a pay-for-performance plan to increase worker productivity, you must think carefully about the risk tolerances of your employees. If your employees are highly risk averse because they depend on a stable income, then you may have to pay a large risk premium to get employee buy in. The gain in productivity from the pay-for-performance plan might not offset the increase in risk premiums required to maintain employee morale and loyalty. In this case, it may be cheaper to forgo pay-for-performance and look for alternative ways of motivating performance. One caveat is that if performance incentives

are absolutely necessary, then the employee may have to bear some risk. Then the manager must carefully balance risk versus incentives. See http://ohioagmanager.osu.edu/resources/wu_part4.pdf for a detailed discussion.

Second, risk neutral individuals or firms can make money by bearing risk for others. For example, one aspect of agricultural contracts is that contracts can allocate financial and production risks between contractor and farmer. If the contractor is a large, well-diversified company and the supplier is a small grower that produces only one or two commodities, then the optimal allocation of risk would be for the contractor to bear most of the risk and the supplier to bear a small portion of total risk. Why? Because the risk premium of the contractor is low relative to the risk premium of the farmer. Therefore, the “cost” of risk bearing is lower for the contractor than farmer. By bearing more of the risk, the contractor can avoid having to pay a relatively expensive risk premium to the farmer. This increases profits for the contractor. Essentially, the risk neutral contractor is providing insurance to the farmer in exchange for the farmer's risk premium.

Lesson 3: Take advantage of differences in risk premiums to recruit and retain workers and suppliers.

Because different people have different risk preferences, their willingness to accept certain types of employment also differs. Thus, an employer can carefully design a compensation strategy to induce certain types of people to self-select themselves into a job.

Ed Lazear, an economist at Stanford University, studied a change in compensation method at Safelite Glass Corporation in Columbus, Ohio. In 1994–95, Safelite changed the compensation method from pure hourly wages to piece rate variable pay, where glass installers' pay depended on the number of glass units installed. Thus, while take-home pay became more variable and therefore riskier, the expected pay for strong performers was higher than what they would have earned under the old hourly pay plan. Lazear examined over 3,000 workers at all Safelite locations over a 19-month period and found that a switch to a pay-for-performance piece rate system resulted in about a 44% increase in productivity per worker. The output gain can be split into two components: a selection component and an incentive component. The “selection effect” refers to the gain that came from worker turnover where workers either were attracted to the piece rate or left the company because they did not like the piece rate. This selection effect, which is strictly due to a change in composition

of workers, resulted in a 22% increase in productivity. Presumably, the individuals who were attracted to the piece rate were willing to tolerate more risk in exchange for higher average payoff. The simple lesson here is that your compensation plan can actually attract certain types of workers. A highly variable compensation scheme that promises high payoffs for good performance is attractive to risk neutral types who do not mind risk. A fixed pay plan is attractive to risk averse types who are willing to accept lower average pay to avoid risk. The best plan for you depends on the nature of the job and the amount of risk taking you require of your employees.

Lesson 4: There are three major types of risk management strategies—diversification, hedging, and insurance.

Diversification simply means to not put all your eggs in one basket. Most people are familiar with this concept because it is drilled into their heads by financial advisors. Thus, conventional wisdom would say that firms should diversify across product lines and farmers should diversify across crops. However, when diversifying, it is important to recognize that diversification is most effective when the various product lines or crops are not highly correlated with each other. For example, if the price of crop A and crop B rise or fall together, then diversification has little impact on risk exposure. Another point to keep in mind is that when evaluating risk exposure, it is important to consider the firm or farm as a whole and not focus only on individual sources of risk. It is possible that the various risks are uncorrelated or even negatively correlated so that the farm may be exposed to less total risk than it appears. For example, farmers are exposed to both price risk and production risk for their crops. If one focuses on price risk and production risk separately, it would appear

that farmers are exposed to a lot of risk. But suppose crop failures cause a supply shortage which increases prices. Then it is possible for *revenue* (price \times quantity) to remain constant so that farmers face relatively little risk. Note here that price and quantity move in opposite directions, which is why revenue risk is minimized.

Hedging means that you take an action that reduces your exposure to downside risk while sacrificing your opportunity for gain. You can achieve this by making forward purchases or sales to lock in on a price. By locking in on a price now, you eliminate your exposure to future prices swings. *Futures contracts* can be used to serve this purpose. Futures contracts are only one of many *derivative* instruments that are available for managing risk exposure. A complete coverage of derivatives is beyond the scope of this article. However, there has been a proliferation of good books on derivatives available in the business section of any good bookstore or library.

One can also purchase *insurance* to cover potential losses. With insurance, you are essentially willing to accept a sure loss that is small (you pay a premium) to avoid the possibility of a large loss in the future. Farmers can purchase crop insurance and there are many forms of business insurance available. In addition, some financial derivatives such as *options*, which gives the holder the right (but not the obligation) to purchase or sell something at a specified price in the future, can serve as a form of insurance.

Note that with both insurance and hedging, you must give up something to eliminate your risk exposure. What you give up with hedging is the potential for future gain. With insurance, you do not give up the opportunity to gain in the future; instead, you pay an insurance premium upfront. The method you choose should be the method that minimizes your costs of achieving the risk management level you desire.

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