Uncertainty and Information

<u>Terminology</u>
Incentive Compatibility (IC): Incentivize the firm you are paying to put in a high level of effort over a routine level
Participation Constraint (PC): Paying the firm enough to take the job at all
Pooling Contract: A 'one-size-fits-all' contract; everyone is pooled into the contract

Strategies for the Less-Informed Player:
Incentive Schemes: Create a situation in which unobservable actions create observable outcomes, e.g. 'effort' leading to measured test score
Screen / Filter: Create a situation in which players' observable actions reveal their unobservable traits, e.g. college degree used as a measure of commitment in seeking employment

Strategies for the More-Informed Player:
Signaling: Using actions that the other players would interpret in a way that would favor you in gameplay
Signal Jamming / Hiding: Trying to not convey this information

<u>Incentive Scheme Example</u>
Let P(success) = .6 if their effort is routine ($\$100,000$), P(success) = .8 if their effort is high ($\$150,000$). The project is worth $\$600,000$ if successful.
1. Fixed Payment: They want $\$100,000$ to take the job. Any payment over that still results in routine effort since the payment is fixed.
So, Expected Profit is $(.6)(600,000) - 100,000 = \$260,000$.
2. Observable Effort: Though we cannot accurately measure effort, we act as if we can here.
Routine: Expected Profit is $(.6)(600,000) - 100,000 = \$260,000$,
High: Expected Profit is $(.8)(600,000) - 150,000 = \$330,000$.
3. Fixed Payment + Bonus (f, b):
IC: Π_f for routine effort is $f + .6b - 100,000$, Π_f for high effort is $f + .8b - 150,000$.
We want $f + .8b - 150,000 \geq f + .6b - 100,000 \implies b \geq 250,000$.
So, set the bonus to be $\$250,000$ for the firm to be incentivized to work with high effort.
PC: We want $f + .8b \geq 150,000 \iff f + .8(250,000) \geq 150,000 \implies f \geq -50,000$. So, set the fixed payment equal to $-\$50,000$ to get the firm to take the job.
Thus, our expected profit is:
$\Pi = (.8)(600,000) - [-50,000 + (.8)(250,000)] = \$330,000$.
This expected profit is equal to the "observable effort" scheme. So, we created an incentive scheme that produces the same profit as a scheme in which we can accurately calculate effort.

Auto Insurance
Assume $\frac{1}{2}$ population are high-risk drivers with P(accident) = .9, $\frac{1}{2}$ are low-risk drivers with P(accident) = .1. Assume every accident costs $\$10,000$.
The expected cost is $(.5)(.9)(10,000) + (.5)(.1)(10,000) = \$5,000$.
Offer a contract of full insurance with a $\$5,000$ premium to reach a 'break-even' point.
But, the high risk drivers will take the deal since they expect to incur a cost $\$9,000$ a year and the low risk drivers won't take it since they expect to incur a cost of $\$1,000$.
So, we create two contracts:
1. Full Insurance & High Premium
2. Low Premium & Deductible

Education as a Screening Device
Q: How many units should an MBA program be?

Assume there are two types of workers:
1. High Quality: Net Present Value (NPV) of salary is $\$1,700,000$
Disutility per MBA Unit: $\$5,000$
2. Low Quality: NPV of salary is $\$1,400,000$
Disutility per MBA Unit: $\$10,000$

We want to set up the MBA so that it is a screening device to filter out low quality workers and keep in high quality workers. Let n be the number of units.
High Quality Getting MBA: $1,700,000 - (5,000)n > 1,400,000 \implies n < 60$.
Low Quality Not Getting MBA: $1,400,000 > 1,700,000 - (10,000)n \implies n > 30$.
Thus, we place the units that the MBA requires between 30 and 60.
Less than 30 and everyone is incentivized to get the MBA.
More than 60 and everyone is disincentivized to get the MBA.