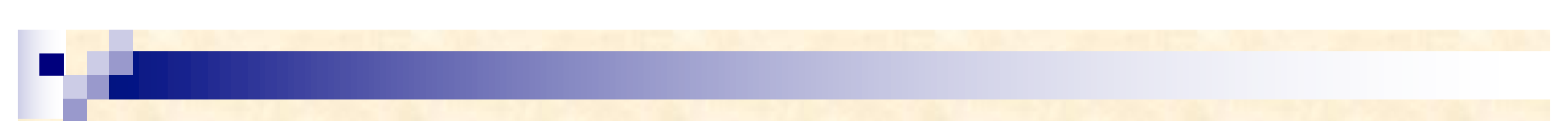




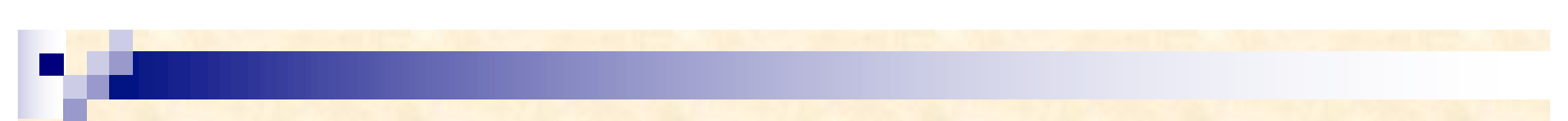
Incomplete Contracts and Control

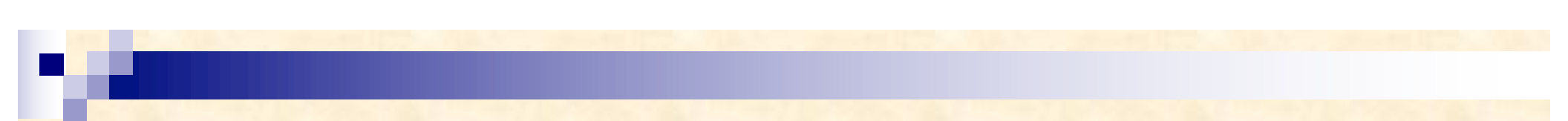
Oliver Hart
Nobel Prize Lecture
December 8, 2016




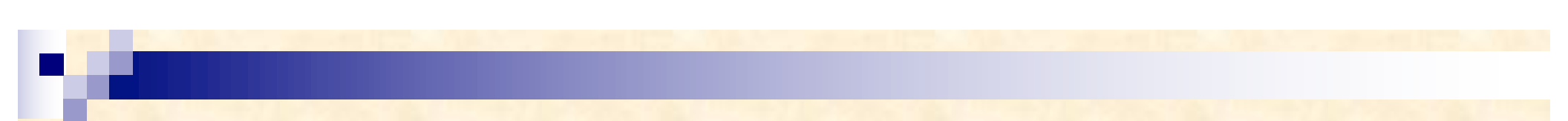
How my work in this area started

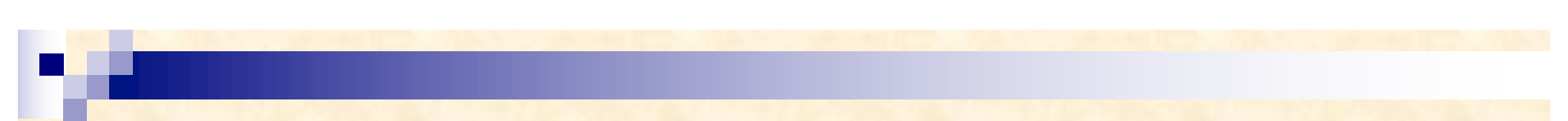
- In early summer 1983, Sanford Grossman and I became interested in the following question:
Why would one firm ever buy another firm rather than conduct business with that firm through a contract?
- In other words, what are limits of contracts?

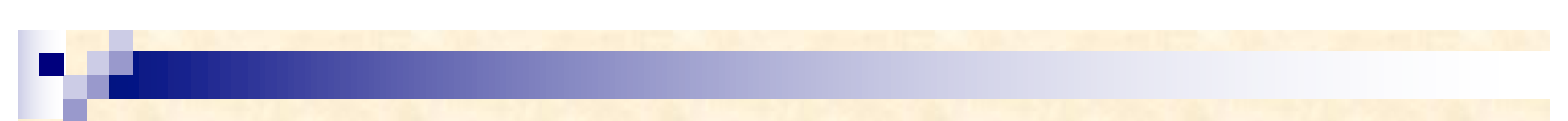
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- We knew that there was a literature on this question and that Ronald Coase and Oliver Williamson, among others, had made notable contributions. But their work was “informal”. As economic theorists our goal was to develop a formal model of the differences between arms-length contracting and integration or a merger.
 - We worked intensively for ten days. With apologies to John Reed, it was ten days that shook my world. At some point we realized that the key elements to understanding the difference are contractual incompleteness and the notion of residual control (or decision) rights.


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- To illustrate these ideas, consider a power plant that locates next to a coal mine with the purpose of burning coal to make electricity.
 - It could sign a long-term contract with the coal mine, specifying the quantity, quality, and price of coal for many years to come.
 - But any such contract will be incomplete. Events will occur that the parties could not fully foresee when they started out.

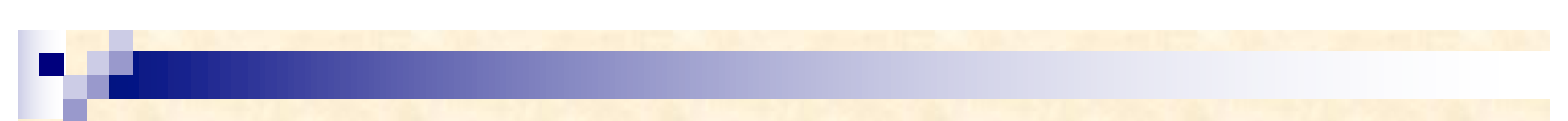
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- For example, suppose that the power plant needs the coal to be pure but that it is hard to specify in advance what purity means given that there are many potential impurities.
 - Imagine that ten years on, ash content is the relevant impurity and that high-ash-content coal is more expensive for the power plant to burn but cheaper for the coal mine to produce.
 - Given that the contract is incomplete, if the power plant and the coal mine are separate companies, the coal mine may be within its rights under the contract to supply high-ash-content coal.
 - The power plant can, of course, offer to pay the coal mine to switch to low-ash-content coal, but the coal mine is in a very strong bargaining position. It can demand a very high price: it has the power plant "over a barrel."

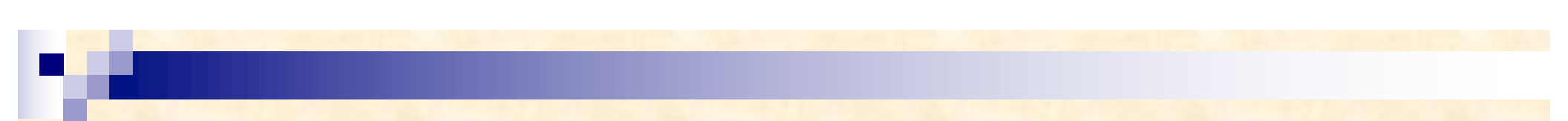
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- Anticipating the possibility of being “held-up”, the power plant may be reluctant to become totally dependent on the coal mine for its source of coal, even though this is efficient.
 - It is worth going into more detail about the source of the coal mine’s “hold-up” power. Grossman and I argued that it is because the owner of the coal mine has *residual rights of control*: the right to decide on uses of the coal mine about which the contract is silent.
 - Indeed, Grossman and I essentially defined ownership to mean this.
 - In this case the key residual right of control is the decision about what kind of coal to mine.

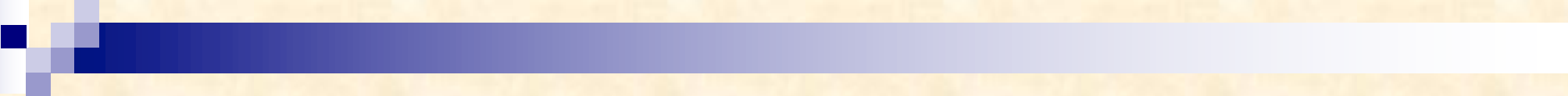
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- Is there anything the power plant can do to avoid this situation?
 - Short of writing a better contract, one thing it could do is to buy the coal mine in advance.
 - That way the power plant as owner of the coal mine will have the key residual control right. The coal mine can no longer extract a high price by threatening to produce high-ash-content coal: the power plant can order the coal mine manager to mine low-ash-content coal.
 - In an extreme case, if the coal mine manager threatens to disobey the order, the power plant can fire the manager and replace him with someone else.

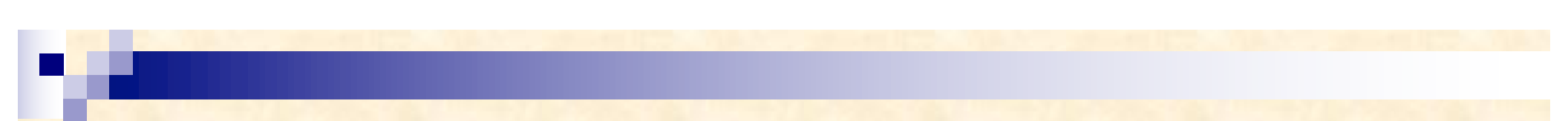
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- One consequence is that the power plant may now be willing to become dependent on the coal mine.
 - This is the benefit of integration—the purchase of the coal mine by the power plant.
 - But, and this very important, the manager of the coal mine, who, say, previously owned it, is now MORE vulnerable.

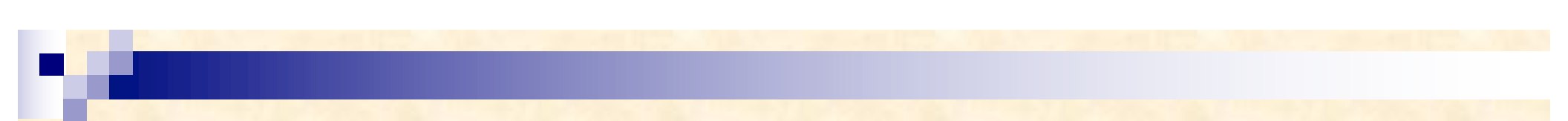
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- For example, suppose that the manager has an idea about how to mine coal more efficiently. If the manager owns the coal mine he can be confident about reaping the returns from this idea. But if the power plant owns the coal mine, the manager's position is much less secure: for example, the power plant could fire him and use his idea anyway. Anticipating this, the manager has a lower incentive to innovate.
 - Bottom line: Integration has costs as well as benefits.

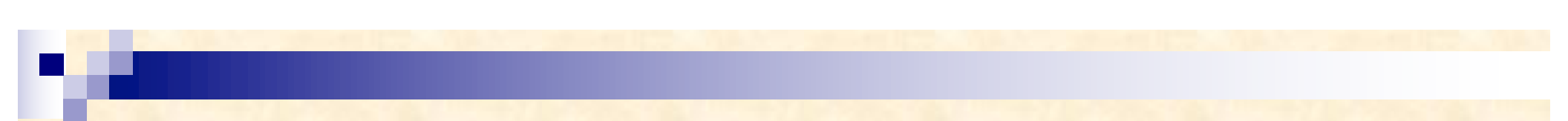
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- In a 1990 paper with John Moore I generalized the analysis to the case of many assets and workers, and more complicated ownership structures, such as joint ownership.

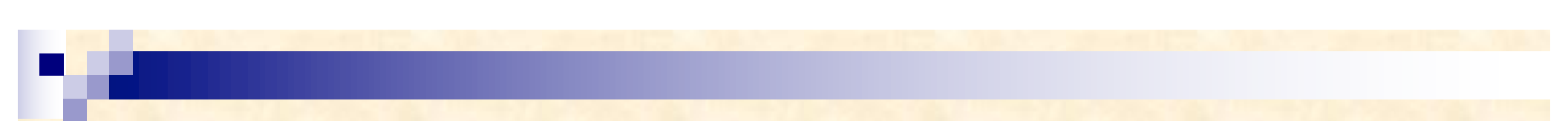
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- Two main differences from the previous literature.
 - The analysis is more formal (can't see it from today!)
 - The focus is on control over physical (more generally, non-human) assets rather than authority over people.
 - Ownership of the coal mine is not worth much to the power plant if the manager of the coal mine is indispensable.


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- As well as helping us to understand mergers, this approach has other applications.
 - One is to corporate finance.
 - In the electricity-coal example, replace the power plant by a financial investor.
 - That is, suppose the coal mine needs money to expand/modernize. It approaches someone with deep pockets and promises them a substantial share of future profit to persuade them to invest.

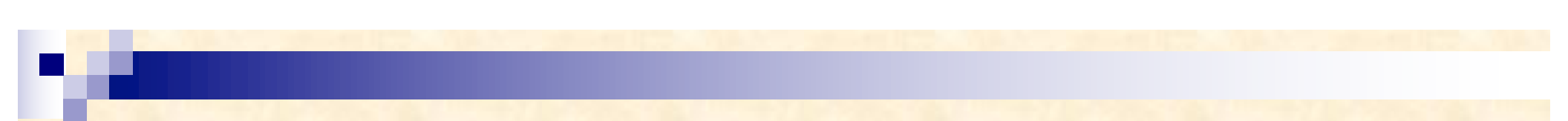
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- Like the contract between the power plant and the coal mine, the financial contract between the investor and the coal mine is likely to be incomplete. The investor is therefore worried about opportunistic behavior (cf. hold-up) by the manager of the coal mine.
 - For example, the manager could divert earnings: he could pay himself a large salary or reinvest profits rather than paying back the investor.

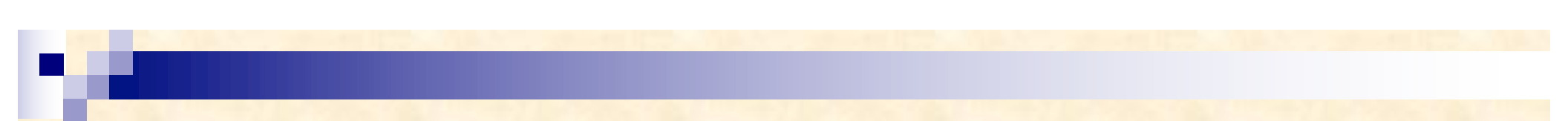
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- One way to protect the investor against opportunism is by giving her residual control rights or votes. For example, she could become the owner of the coal mine, rather than having an arms-length contract with the coal mine. This would allow her to intervene to stop opportunistic behavior, e.g., she could control the manager's salary or even replace him.
 - But as we have seen there can be a downside for the manager of the coal mine: his incentive to have ideas may be reduced if the investor has control.


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- Aghion and Bolton (1992) showed that one way to balance these effects is to make control state-contingent. That is, the manager will have control in some situations/states of the world—typically, good states—and the investor in others—typically, bad states. A paper by Kaplan and Stromberg (2003) showed that venture capital contracts indeed have these features.

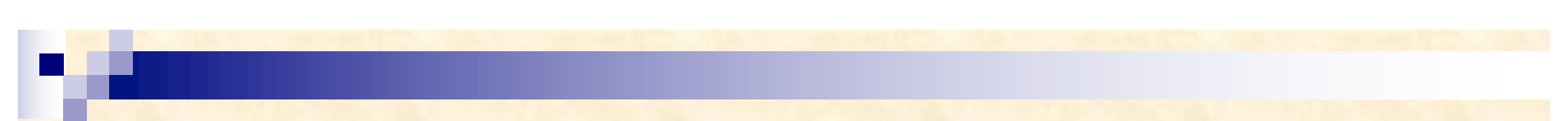
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- In a paper written in 1989, and published in 1998, John Moore and I showed that, under some assumptions, the optimal contract takes the form of a debt contract: viz,
 - The coal mine promises to make a fixed stream of payments to the investor. As long as these payments are made the manager of the coal mine remains in charge, i.e., retains (residual rights of) control over the coal mine. If a payment is not made control shifts to the investor, who can decide whether to replace the manager or sell the mine.

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- Debt contracts are, of course, ubiquitous, and the analysis helps to explain why they are used.
 - The analysis also casts light on the importance of collateral. The investor is better protected if the physical assets of the mine are important relative to the manager's human capital. (See also Hart and Moore (1994).) In this case the investor can appropriate a large fraction of the project's value. The coal mine can therefore borrow more.
 - Further, the more slowly the physical capital depreciates (the more "durable" it is), the longer can be the maturity of the debt contract.
 - It's the other way round if the human capital is important relative to the physical capital: now it's hard for the coal mine to borrow much.
 - Empirical support for these implications has been obtained by Benmelech (2009).

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- A second application is to public vs. private ownership. See my 1997 paper with Andrei Shleifer and Robert Vishny.
 - Replace the power plant by the government and the coal mine by a prison.
 - Clearly, the government has to pay for prison services but does it need to own the prison?
 - Might it be better to contract with a private company to look after the prisoners?
 - Again it boils down to contractual incompleteness and the allocation of residual control rights.

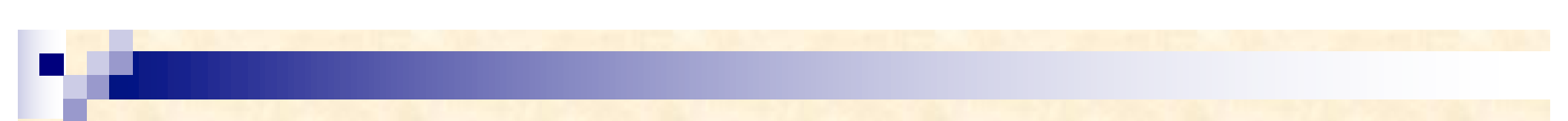
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- If the prison is privately run, the prison company may find ways consistent with the contract to save money but this may be at the expense of quality, which is undesirable for the government/society.
 - For example, the company might hire cheaper but less well-trained guards. (This is analogous to the coal mine choosing to mine high-ash-content coal.)
 - On the other hand, a privately-run prison might have a greater incentive to innovate, e.g., come up with socially valuable rehabilitation programs. (This is akin to the manager of the coal mine having better ideas.)

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- Which effect is more important will determine whether public or private ownership is better.
 - The 1997 paper argued that the first effect is likely to dominate the second in the case of maximum security prisons, where the quality of the guards is particularly important. Thus prison privatization is probably a bad idea in this case.
 - There are other cases where the trade-off goes the other way and privatization is good.
 - The analysis is perhaps useful in showing that economics rather than politics can guide us on the public-private choice.



If I had more time...

- I would talk about why in recent work I have introduced behavioral elements—in particular, a concern by the contracting parties for a reasonable or fair outcome—to understand at a deeper level why contracts are incomplete.
- I would also talk about two legal cases I was involved in, where I used the work I have described as an expert witness for the U.S. government.

- 
- You will have to wait for the full lecture to learn about these....

Some of my co-authors in this endeavor...



Sanford Grossman



John Hardman Moore

Some of my co-authors in this endeavor...



Andrei Shleifer



Robert Vishny

Christian
Zehnder



Ernst Fehr

Some of my co-authors in this endeavor...





■ THANK YOU !!