A Wholesale Pool Spot Market Must Be Administered by the Independent System Operator: Avoiding the Separation Fallacy

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Introduction

The notion of an Independent System Operator (ISO) has gained some currency in discussions of electricity market restructuring. There are significant advantages in this approach, but the key to success will be in a careful specification of the functions and responsibilities of the ISO. Simple independence of the individual participants is not enough; the ISO should support an efficient, competitive market.

There is wide recognition that there must be a system operator coordinating use of the transmission system. This control of the use of the transmission grid means control of the dispatch, at least at the margin, because adjusting the dispatch is the principal (or, in some cases, only) means of affecting the flow of power on the grid. That this system operator should also be independent of the existing utilities is attractive in the greater simplicity of achieving equal treatment of all market participants. The ISO would be providing a service, but would not be competing in the energy market. Hence, the easy-to-state but hard-to-enforce principle of comparability would be transformed into an easier to enforce principle of non-discrimination.

Separation Fallacy

This call for a system operator that is independent of the participants in the market has been recast of late into the dangerous notion that the ISO should be independent not just of the participants, but also of the spot market. There have been some recent assertions that any pool-based spot market in electricity should be organized in a power exchange (PE) that is strictly separated from the activities of independent system operator. The argument is that the system operator could and should provide transmission services to everyone without any involvement

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in operating the power exchange dispatch and the associated spot market. Most significantly, there has been an assertion that the independent system operator should not receive any bidding information, perform any economic dispatch, or determine any spot market prices.

This is a seriously flawed idea. There is no commercial or technical case for separating operation of a spot market into a PE and an ISO. There are, by contrast, very good reasons for keeping these functions together. These reasons explain why ***there is no competitive electricity market in the world where an ISO has been separated from the function of providing a bid-based economic dispatch.*** And when the extreme suggestion to sharply curtail the functions of the ISO by precluding any bidding information is described to those familiar with the operation of electric systems, but outside the circle of proponents of the separation fallacy, the response is one of disbelief that there could be serious consideration of such an idea. Furthermore, when considering the broader objectives of both efficiency and non-discrimination for transmission access and pricing, an ISO economic dispatch could be the natural source of consistent locational prices.

The proponents of the separation fallacy begin with a concern that "physical bilateral transactions" be included as part of the new competitive market structure. Furthermore, the expressed concern is that these bilateral transaction should be treated fairly relative to those handled through any power exchange. Through a serious of mistakes and misunderstandings, the argument progresses from this goal to a conclusion that the PE must be sharply separated from the ISO.

There is no technical or commercial conflict between bilateral transactions and a pool-based spot market. In fact, the Poolco model of a bid-based spot market operated by an ISO arose out of a concern for the problems of supporting a non-discriminatory, efficient competitive market in the face of network interactions. Using the ISO to implement the pool-based spot market and coordinate bilateral transactions is the solution, not the problem.

Objectives

The ISO should advance the objectives outlined in many state proceedings and in the Federal Energy Regulatory Commission's (FERC) various Notices of Proposed Rulemakings (NOPR) on pooling and transmission access. Without enumerating everything, the relevant objectives include:

Reliability. The ISO responsibilities should include coordinating short-term operations to ensure reliability while supporting the competitive spot market. [The distinction is that the ISO is not entering into long-term power contracts which are left to the market.]

Independence. The governance structure and incentives for the ISO should be designed to ensure that no one subset of the market participants is allowed to control the criteria or operating procedures.

Non-Discrimination. Access to and pricing of services should be applied to all market participants without distinction as to customer identity or affiliation.

Unbundling. Services should be unbundled when possible for acquisition from the competitive market and for utilization by the market participants. [There is a subtle distinction here. There are some inherently joint or common services (e.g., certainly computer services, and probably spinning reserves), that could be competitively acquired by the ISO but not selectively attributed to the market participants.]

Efficiency. Operating procedures and pricing of services should support an efficient, competitive market for electricity. Attributable costs should be paid by the responsible parties. There should be no cost shifting. Joint costs should be allocated fairly with minimal impact on efficient incentives. Pricing and access rules should reinforce efforts to mitigate market power in generation.

The interesting part, and the battleground of the moment, is in dealing with this "efficiency" objective. The importance of paying explicit attention to efficiency can be seen by reduction to the absurd case of minimizing use of the transmission grid, an operating policy which could meet the other objectives. The challenge is to describe efficient procedures for full use of the grid that would apply in the presence of transmission constraints; everything would be much easier with no transmission constraints, but we should not sweep the hard part under the rug. Although this subject could fill volumes, we can concentrate on two critical issues:

Economic Dispatch. The short-term complexity of the interactions in the transmission grid requires the ISO to adjust the dispatch to meet transmission constraints and maintain balance in the system. The criterion for adjusting the dispatch should be to provide the most highly valued use of the grid based on the preferences of those in the market. In other words, users should provide bids, at least incremental and decremental bids around quantity schedules, and the ISO should use this information to determine the most economically rational use of the transmission system for the current dispatch. [See below for a separate discussion that illustrates how economic dispatch with such bidding could work, and how it might be frustrated.]

Efficient Pricing. The most significant attributable costs are the direct cost of power and the short-term cost of congestion in the transmission grid. The congestion cost arises when transmission constraints force some more expensive plants to operate. This cost of congestion would differ by location. Those causing the congestion at the margin should pay for it, and these prices should apply to everyone. [This would be locational, marginal cost pricing. There is an important but separate issue of how to distribute the revenues received by the ISO. This can be done in a manner consistent with the FERC prohibition of "and" pricing and in support of long-term transmission contracts. The proposal to use transmission congestion contracts is developed further

in various filings on the FERC transmission NOPRs.[2]]

With efficient pricing, it is straightforward to achieve non-discrimination. Importantly, except in extreme circumstances, everyone in the market would be dispatched according to their stated preferences, and there would be no cost shifting due to congestion in the system. Use of the associated efficient prices would remove some of the most significant artificial incentives to game the system. Furthermore, all of this would be compatible with the longer term functions of any Regional Transmission Group.

When the ISO performs these functions, the ISO is just another name for a Poolco. The political baggage that has built up around the terminology should not be allowed to confuse the reality. As has been explained many times (and about as many times ignored or misrepresented) this approach is fully compatible with any kind of bilateral transactions that could be made without cost-shifting or without discrimination in favor of certain market participants. In fact, this approach expands the options of everyone in the market by making a virtue out of the necessity of central coordination. This approach is followed in Norway, which is often cited by "direct access" advocates as the best example of a competitive market that supports bilateral transactions. But the opponents of the Poolco approach conveniently ignore the oft repeated admonition of Jan Moen, the Norwegian regulator, that "[t]he importance of effective Pooling arrangements in a competitive [Electric Supply Industry] cannot be overstated." In fact, much of the argument of the opponents appears to confuse and distract through semantic ambiguities, rather than to clarify the essential elements that need to be put in place.

The debate of late has created certain fresh semantic traps. For example, the effort in California and elsewhere to bifurcate the ISO and the "commercial" operations of a short-term pool implies that there are many commercial functions needlessly assigned to a pool that can obviously be separated without harming either reliability or economic efficiency. In reality, there is only one function of the pool that is isolated as the target, and this is economic dispatch with the associated locational pricing. The justifications offered for the proposed separation rest on appeals to principles of competition. However, the supporting theory of competitive markets and decentralized decisions would depend on the existence of well-defined and tradeable property rights for controlling flows in the transmission grid. Nobody has produced a workable arrangement for such property rights, which is the principal feature that distinguishes the electricity market from the close analogy of the case of natural gas. This is where the loop flow problem rears its head. Because of loop flow one cannot independently dispatch each line or contract path, but must consider the grid as a whole. As a result, it is not possible to identify the highest-valued use of any transmission line without knowing the value of all other proposed uses of the transmission grid. Without a system of property rights that solves this problem,

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[2] W. Hogan "Electricity Transmission Policy and Promoting Wholesale Competition," Initial Response to the Notice of Proposed Rulemaking Regarding Promoting Wholesale Competition Through Open-Access Non-Discriminatory Transmission Services by Public Utilities, Federal Energy Regulatory Commission, Docket No. RM95-8-000, Harvard University, August 7, 1995.

separation of the dispatch function from the ISO would increase costs. It would be a bizarre outcome if public policy for electricity restructuring resulted in an abandonment rather than an expansion of economic dispatch.

A second semantic trap is in arguments which assume that an unstated but overriding objective of restructuring is to support competition -- not in power supply -- but in dispatch services. To be sure, the ISO would have an advantage in providing dispatch services, but as the Department of Justice has recognized, this advantage comes because the ISO can internalize all the information provided and deal with the complex interactions throughout the grid. This is an efficiency advantage that should be exploited, not discarded. Multiple aggregators could provide long-term services outside the scope of the ISO, or if they wish, even enter into competition in providing dispatch services; but it would be triumph of rhetoric over reality to set up a goal of creating "a level playing field" for competition in dispatch services as so important as to dictate government regulations to prohibit the ISO from offering this critical service. Only those who would benefit from the higher costs and reduced efficiency could see this as progress.

Even more important than economic dispatch per se would be the use of the efficient prices that capture the effects of transmission congestion. This efficient transmission pricing approach would provide the key link to transmission congestion contracts that could be used to allocate the benefits along with the costs of the transmission grid. This approach could be used to protect native load, implement opportunity cost pricing without the "and" complications, help mitigate market power arising from transmission constraints, resolve the long-unsolved problem of defining the capacity of the transmission network, and so on. These near miracles are not quite up there with balancing the budget without any pain, but they are within reach.

Electric Transmission is Not Just Transportation

Although the arguments tend to change, the concerns or requests of the proponents of the separation fallacy, with a focus on the impacts on bilateral transactions, appear to cover a series of related points. A stylized rendition of these points, along with the outline of the rebuttal or explanation, includes the following:

"We want transmission service for a simple (low) price per unit for use of the system. We should treat electric transmission just like any other transport system."

> Electric transmission is not like any other transport system, chiefly because it is not a switchable network. Interactions throughout the network, known collectively as "loop flow," make it impossible to isolate or even identify in advance the impacts of an individual transaction. Each transaction can impose (sometimes substantial) costs on others. If users are not paying the opportunity costs of their transactions, then there is by definition cost shifting.

"OK. If we have to pay the opportunity cost of our bilateral transactions, tell us in advance what

it will be so we can get on with our business."

> In a perfectly competitive market or under an economic dispatch, the marginal opportunity cost of transmission between two points is the difference in the spot market locational prices. The locational prices cannot be known without knowing everything else about the dispatch. Hence, these prices cannot be set in advance.

"OK. Then just give us property rights in the transmission grid so we know how much power we can send through the system."

> The difficulty is the flip side of the opportunity cost problem. We can't say how much power can flow from anywhere to anywhere else without knowing how everybody else is using the grid. Hence, we have not been able to define workable property rights to govern the physical flow of power through the transmission grid. And without such property rights, decentralized decisions cannot be economically efficient. By contrast, transmission congestion contracts supported in conjunction with locational pricing could provide the economic equivalent of the impossible to design physical property rights.

"OK. Then at least let us bid for the transmission links through an open and transparent auction."

> The difficulty is that bidding and trading for transmission is intimately connected to the bidding and trading for power. When we combine the two auctions, we get the familiar economic dispatch problem. When we try to separate them, we have a difficult and complex coordination problem. Nobody has been able to demonstrate a workable mechanism for how to coordinate such a complex process other than through bidding into an ISO and letting the ISO determine the economic dispatch.

"But economic dispatch implemented by the independent system operator creates an inherent conflict of interest with an unavoidable bias in favor of transactions through the pool."

> Wrong. The ISO is independent of the participants in the market and is responsible for determining an economic or least-cost dispatch based on the preferences of everyone in the interconnected system covered by the ISO's activities. The use of an economic dispatch with locational prices is precisely a means to ensure that both the spot-market bids and bilateral transactions are treated in the same way. Basing the payments for transmission opportunity costs on the locational price differences eliminates any bias in favor of *or against* the spot market.

The proponents of the separation fallacy either misunderstand or misrepresent the critical features of the pool-based spot market implemented by the ISO. The access and pricing rules under the ISO provide necessary incentives to support an efficient competitive market while treating all transactions on the same basis. The interesting case is in the treatment of congestion in the transmission system. In the absence of congestion, there is no difficulty; but in the

presence of congestion, the combined use of bid-based economic dispatch and locational prices is necessary for a non-discriminatory, efficient outcome.

Examples of the Separation Fallacy and the Economic Dispatch Reality

The idea that the short-term dispatch functions of a Poolco can be divided in two, with the transmission and reliability responsibilities vested in an ISO while the commercial functions are restricted to a separate pool or power exchange suffers from a number of defects. First, the discussion of the commercial functions is often clouded in ambiguity but implies objections to activities that in reality are not part of the Poolco functions and that extend well beyond the actual requirements of the short-term dispatch. To the contrary, the Poolco system operator need not be involved in long-term pricing of bilateral transactions. Hence, the principal "commercial" function of the ISO would be analogous to that of the New York Stock Exchange in matching up buyers and sellers of power, and only for the short-term dispatch. The actual "commercial" functions of the ISO are already few, and the need for the ISO to be involved in these functions stems from the nature of the complex network interactions and requirements of reliability. Any purported separation of longer term commercial functions is unnecessary because the functions have already been "separated" in the Poolco approach.

A second danger in the proposed dichotomy is the companion effort to define narrowly the "reliability" functions of the ISO. The effect may be to "handcuff" the ISO by limiting the information available and preventing direct participation in economic dispatch. In addition, the issue of transmission usage pricing arises in the discussion of the interaction between the ISO and the market participants, with special emphasis on the treatment of "physical" bilateral transactions and dispatch of other transactions through a pool.[3] Bilateral transactions and a pool can co-exist, but the ability to provide efficient, non-discriminatory transmission depends critically on the tools provided to the ISO. At one extreme, regulators could be asked to apply handcuffs that would virtually preclude efficient use of the transmission system. Alternatively, a harness fashioned from different procedures could put the ISO to work in solving some of the most difficult problems that market participants and regulators face in simplifying and ensuring efficient, non-discriminatory use of the transmission grid.

Handcuff the ISO. The most restrictive approach would limit the ISO by foreclosing market participants from providing information on their willingness to pay or be paid to adjust either generation or load under the self-nominated schedules of bilateral transactions. This is a strongly emphasized and explicit objective of some of the advocates of somehow separating the ISO and a pool. If so, then comparable treatment would similarly preclude the ISO from receiving such bidding or economic dispatch information from anyone. In this case, the ISO would have no bidding information associated with the schedules. All nominations would be in the form of

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[3] Whether accounting for bilateral transactions is done through "physical" tracking or financial "contracts for differences" is a detail that matters little other than for jurisdictional distinctions between state and Federal authorities.

"quantity only" schedules: i.e., schedules of the form of '100 MW from A to B,' '150 MW from C to D,' etc. The ISO would have no information about the relative values of the schedules. The underlying theory of this approach relies on physical delivery of specific power from specific locations -- essentially the contract-path model of transmission -- and the ability to manage transmission constraints with only a simple ranking system.

The contract-path model is a fiction that is not compatible with an efficient competitive market, as has been explained enough by now not to require repetition here. Furthermore, the notion that efficient management of the transmission grid can be found through comparing simple rankings of quantity transactions ignores the real complications of the transmission system. In the face of congestion, transactions should not be reduced in a simple sequence of priorities: "If interchange must be reduced, interrupting certain interchange transactions may *worsen* the transmission overload."[4] Without information about the relative value of the transactions, provided through discretionary bids, the ISO would not have the essential information to determine efficient redispatch or calculate the costs of congestion. The result would be an excessively conservative and inefficient use of the transmission system, with complex battles over queues and priorities.

The avowed goal of the advocates of this approach is to treat electric power transmission "just like any other transport system" with both simple pricing and a transporter having no role in adjusting production activities. Although the details are swept under the rug, the advocates of this position have no solution to the problem of defining transmission property rights in a way that would eliminate the need for central dispatch. In practice, the advocates appear to envision rather ad hoc rules for proportional transmission reductions or simple first-come, first-served priority rules whenever there are transmission constraints. The result would be to remove any rational economic criteria for the ISO to use when dispatching in the presence of transmission constraints. Without such information and the procedures of an economic dispatch, the dispatch will not be least cost. Furthermore, the "simple" transmission usage prices would be unrelated to the actual opportunity costs of moving power across constrained interfaces.

Both the inefficient dispatch and the inconsistent transmission prices would raise total costs. They would also create substantial arbitrage opportunities for brokers and other unregulated middlemen who could exploit the inefficiencies that the dichotomy created. Prices would be out of balance with reality, creating profits out of cost-shifting opportunities. The details would vary, but the incentives would be similar to those created by the familiar problem of inconsistent pool pricing under "split savings." Even when the pool dispatch is least cost, pricing in conflict with market opportunity costs can create artificial arbitrage opportunities that will be exploited by competitive market participants. In the further absence of a least-cost dispatch, the difficulties would be compounded. Only the few who stand to benefit from these intentional complications and restrictions of the market could view this as good public policy.

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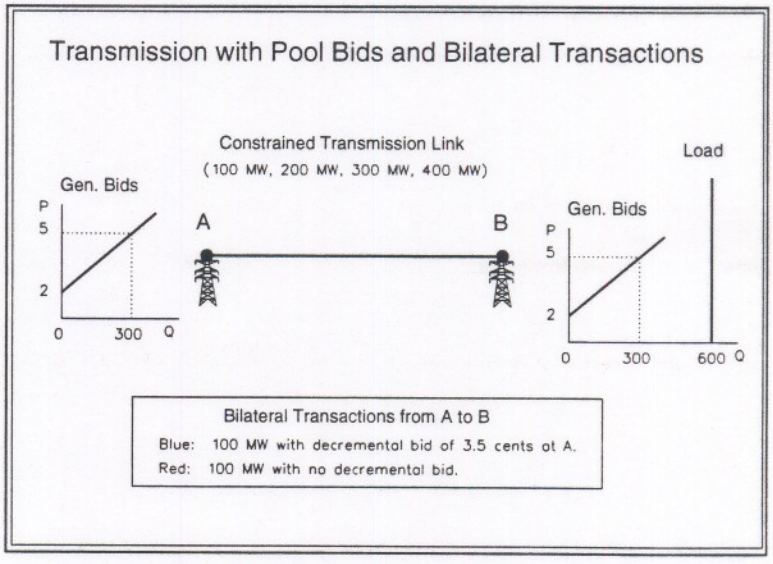
[4] Comments of the North American Electric Reliability Council, "Promoting Wholesale Competition Through Open Access Non-discriminatory Transmission Services by Public Utilities, Docket No. RM95-8-000," Federal Energy Regulatory Commission, August 7, 1995, pp. 20. (emphasis in original)

Harness the ISO. An alternative approach would harness the ISO to support the competitive market. The key is in how the ISO provides balancing services, adjusts for transmission constraints and charges for transmission usage. The ISO would match buyers and sellers in the short-term market. The ISO would receive "schedules" that could include both quantity and bidding information. For the participants in the pool, these schedule-bids would be for loads or generation with maximum or minimum acceptable prices. For the self-nominations of bilateral transactions, the schedule-bids would be for transmission quantities with increment and decrement bids for both ends of the transaction. These incremental and decremental bids would apply only for the short-term dispatch and need not be the same as the confidential bilateral contract prices.

The responsibility of the ISO would be to integrate the schedules and the associated bids for deviations from the schedules to find the economic combination for all market participants. This range of schedule-bids would be more varied and flexible, giving everyone more choices.

A set of examples can illustrate the treatment of spot-market transactions and bilateral transactions, under the ISO's responsibility to achieve an economic dispatch. These examples are simple, but they capture the essential points in terms of the options available for bilateral transactions and through the power exchange. The test of no conflict of interest and non-discrimination is that, other things being equal, there should be no incentive in the dispatch or pricing mechanism to favor either the spot market or the bilateral transaction.



For simplicity, we ignore any complications of market power or long-run issues, such as the creation of transmission congestion contracts, and focus solely on the short-run dispatch and pricing issues. A market with a single transmission lines, as shown in the accompanying figure, allows an illustration of the basic principles. What is less obvious, however, is that these same principles in no way depend on the special case of a single transmission line. Unlike many other approaches, such as ownership and physical control of the line, or the contract-path fiction, these pricing principles extend to a framework to support open access in a complicated network.

The assumptions include:

- Two locations, A and B.

- Total load is for 600 MW at location B. For simplicity, the load is fixed, with no demand bidding.

- A transmission line between A and B with capacity that will be varied to construct alternative cases.

- Pool bid generation at both A and B. To simplify, each location has the same bid curve, starting at 2 cents/kwh and increasing by 1 cent/kwh for each 100 MW. Hence, a market price of 5 cents at A would yield 300 MW of pool-based generation at that location. Likewise for location B.

- Two bilateral transaction schedules, Blue and Red, each for 100 MW from A to B. Each bilateral transaction includes a separate contract price between the generator and the customer; the ISO does not know this contract price.

  Blue provides a (completely discretionary) decremental bid at A of 3.5 cents. In other words, if the price at A falls to 3.5 cents, Blue prefers to reduce generation and in effect, purchase power from the pool. Blue may do this, for example, if the running cost of its plant is 3.5 cents, and it would be cheaper to buy than to generate.

  Red provides no such decremental bid, and requests to be treated as a must run plant.

The ISO accepts the bids of those participating in the spot market at A and B and the bilateral schedules. The load is fixed at 600 MW. The bilateral transactions cover 200 MW, or the person responsible for the bilateral transaction must purchase power at B to meet any deficiency. The remaining 400 MW of load must be met from the spot market to include production at A or B, and use of the transmission line.

In determining the economic dispatch, the system operator treats the pool generation bids in the usual way. The Blue bilateral transaction is treated as a fixed obligation, with the 3.5 cent decrement bid as an alternative source of balancing adjustment at A. The Red bilateral transaction is treated as a fixed obligation, with no such balancing adjustment.

Assuming that the net of the fixed obligations with no balancing adjustments is feasible, which is the interesting case, we can vary the capacity on the link to see the results of the economic dispatch and the payments by the participants. The examples cover four cases, starting at 400 MW of transmission capacity, and reducing in increments of 100 MW. The details are in the accompanying table.

Power Flows and Locational Prices					
		Alternative Cases			
Link Capacity A to B	MW	400	300	200	100
Total Load at B	MW	600	600	600	600
Price at A	cents/kwh	4	3.5	3	2
Price at B	cents/kwh	4	5	6	7
Transmission Price	cents/kwh	0	1.5	3	5
Pool Generation at A	MW	200	150	100	0
Pool Generation at B	MW	200	300	400	500
Blue Bilateral Input at A	MW	100	50	0	0
Red Bilateral Input at A	MW	100	100	100	100

400 MW. In the case of 400 MW of transmission capacity, the economic dispatch solution is just balanced with no congestion. Everyone sees the same price of 4 cents. The payments for each party include:

- Pool Generation at A: Paid 4 cents for 200 MW.
- Pool Generation at B: Paid 4 cents for 200 MW.
- Pool Load at B: Pays 4 cents for 400 MW.
- Blue Bilateral: Pays zero cents for transmission of 100 MW.
- Red Bilateral: Pays zero cents for transmission of 100 MW.

Everybody is happy.

300 MW. In the case of 300 MW of transmission capacity, the economic dispatch solution encounters transmission congestion, and the prices differ by location. The price at A drops to 3.5 cents, and the price at B rises to 5 cents. The opportunity cost of transmission is 1.5 cents. The payments for each party include:

- Pool Generation at A: Paid 3.5 cents for 150 MW.
- Pool Generation at B: Paid 5 cents for 300 MW.
- Pool Load at B: Pays 5 cents for 400 MW.
- Blue Bilateral: Pays 1.5 cents for transmission of 50 MW. Blue makes up the remaining 50 MW obligation at B at a price of 5 cents.
- Red Bilateral: Pays 1.5 cents for transmission of 100 MW.

Everybody would prefer less congestion, but everyone is paying the opportunity cost of the transmission congestion. Note that at these prices, Blue is indifferent to bidding in its generation at 3.5 cents in the pool at A, or continuing as a bilateral transaction. Further, note that the ISO reduced both pool and Blue transactions. There is no artificial bias induced by the ISO fulfilling the directives of the economic dispatch.

200 MW. In the case of 200 MW of transmission capacity, the economic dispatch solution encounters more transmission congestion, and the prices differ more by location. The price at A drops to 3 cents, and the price at B rises to 6 cents. The opportunity cost of transmission is 3 cents. The payments for each party include:

- Pool Generation at A: Paid 3 cents for 100 MW.
- Pool Generation at B: Paid 6 cents for 400 MW.
- Pool Load at B: Pays 6 cents for 400 MW.
- Blue Bilateral: Prefers not to generate and has no transmission. Blue makes up the 100 MW obligation at B at a price of 6 cents.
- Red Bilateral: Pays 3 cents for transmission of 100 MW.

Everybody would prefer less congestion, but everyone is paying the opportunity cost of the transmission congestion. Note that at these prices, Blue is better off than if it had actually generated. Of course, Blue would still be indifferent to bidding in its generation at 3.5 cents in the pool at A, or continuing as a bilateral transaction. Further, note that the ISO reduced both pool and Blue transactions. There is no artificial bias induced by the ISO fulfilling the directives

of the economic dispatch.

100 MW. In the case of 100 MW of transmission capacity, the economic dispatch solution encounters transmission congestion to the point of eliminating everything other than the must run plant, and the prices differ more by location. The price at A drops to 2 cents, and the price at B rises to 7 cents. The opportunity cost of transmission is 5 cents. The payments for each party include:

- Pool Generation at A: No generation.
- Pool Generation at B: Paid 7 cents for 500 MW.
- Pool Load at B: Pays 7 cents for 400 MW.
- Blue Bilateral: Prefers not to generate and has no transmission. Blue makes up the 100 MW obligation at B at a price of 7 cents.
- Red Bilateral: Pays 5 cents for transmission of 100 MW.

Everybody would prefer less congestion, but everyone is paying the opportunity cost of the transmission congestion. Note that at these prices, Blue is better off than if it had actually generated. Of course, Blue would still be indifferent to bidding in its generation at 3.5 cents in the pool at A, or continuing as a bilateral transaction. Further, note that the ISO reduced both pool and Blue transactions. There is no artificial bias induced by the ISO fulfilling the directives of the economic dispatch.

Implications

The examples are simple, but they capture the essential features. These features generalize to a more complicated network under the economic dispatch model in the sense that participants can provide bids at their discretion. Some of the bids can be "must run." The locational prices are easily determined from the economic dispatch considering all the bids and schedules, not just those included in the power exchange. And although everyone would prefer a less congested system, all users would pay the short-run opportunity costs of their contribution to the congestion. Other things being equal, there would be no bias between power exchange and bilateral transactions.

With everyone paying the true locational marginal cost prices, there is no averaging and no cost shifting. Nor is there any need for artificial penalties to force participants into either the spot market or bilateral transactions. When everyone faces the true opportunity costs as represented in the locational prices derived from the actual dispatch, markets and not regulators can decide on the balance between spot and bilateral transactions.

Note that if Blue and Red did not pay the opportunity cost of transmission, there would be a substantial bias in favor of the bilateral transactions. Furthermore, the locational prices are consistent with the efficient competitive outcome, as is best illustrated by Blue's willingness to adjust a bilateral transaction.

Contrary to the argument above, that the ISO would have a bias in favor of power exchange transactions, the treatment of the Red bilateral transaction might lead to an accusation that there is a reverse bias in favor of the bilateral transaction. However, there are two important features of the pricing and access rules that run counter to this assertion.

First, the spot market participants could achieve the same result by bidding in generation at A at a zero reservation price, or lower. In fact, in performing the economic dispatch, the ISO treats the Red transaction as just this type of bid. Under these circumstances, the price at A could drop to zero, or lower, with a corresponding increase in the opportunity cost of transmission.

Furthermore, suppose that Red's true short-term generation cost is 3 cents, but it refused to make a decremental bid to the ISO. Then in the 100 MW case above, Red would have acted irrationally and would be worse off than if it offered such a decremental bid. It can also be shown that the cost thus imposed on Red is at least as large as the total cost imposed on everyone else in the market. Thus Red would pay for its own mistakes; the effect would be a net gain for the other generators and load (although there could be winners and losers, in aggregate everyone else would win).

The simple short-run operating examples raise many other questions that go beyond the scope here.[5]

What would happen to the congestion payments for transmission? They could be paid out to the holders of transmission congestion contracts.

How could the participants protect themselves from the cost of congestion? Pay the price (embedded cost from Gridco or market value in secondary market) for a transmission congestion contract.

How would transmission investments be made? Based on the incentive of avoiding the paying short-run opportunity costs of transmission.

etc.

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[5] For a longer but still outline discussion of other issues, see W. Hogan, "Coordination for Competition, Transmission Pricing and Open Access in the Restructured Electricity Market," Briefing Outline, North American Electric Reliability Council, Board of Directors Meeting, Princeton, NJ, October 3, 1995.

Failure to offer a bid-based economic dispatch will return us to the complications and fictions of the contract-path world of old, and the many artificial arbitrage opportunities that create profit by creating confusion. This would not be good public policy.

Averting Our Eyes

There have been attempts to circumvent these difficulties by redefining the roles of the ISO and the PE so that the PE does nothing more than agree on the rules that have to be implemented by the ISO.[6] Hence the PE transforms into the ISO's governance mechanism. However, the operating responsibilities of the PE would be reduced to the dictum "don't just do something, stand there." All the operating responsibility would be vested in the ISO.

While this outcome presents no problem in theory, it is laden with danger in practice. Supporters of the separation fallacy do not want this outcome, and could at every opportunity use any paper differences between a PE and the ISO to create real differences. With any vagueness in the language, the door to mischief would be open. It would require too much diligence on the part of regulators and others to simultaneously maintain and eviscerate the separation.

There is a need for a governance mechanism, and the governance rules should address the matter of non-discrimination. However, it is not a good idea to label the governance mechanism for the ISO as the "Power Exchange," a term which calls up a completely different meaning. If this is the path to satisfy the concerns of those embracing the separation fallacy, then the governance mechanism should be called something more like the "ISO Governing Board."

Summary

Economic dispatch arose as a solution to a real problem, special to electric networks. That problem does not go away with the introduction of competition, and should not be swept under the rug. Furthermore, efficient pricing of transmission usage is an essential support of the competitive electricity market and widespread customer choice. To ensure non-discrimination, the system operator must be truly independent of individual market participants. To ensure efficiency, the ISO must have information about the relative value of alternative uses of the transmission grid. Transmission access, operation and pricing in a competitive electricity market with customer choice require a network-based approach that goes beyond traditional concepts of transmission management. In the face of transmission constraints, use of the system would include pricing to reflect congestion or redispatch costs. These short-term transmission prices would differ by location and would apply to all users of the system. The congestion prices would be obtained as a byproduct of the determination by the ISO of the constrained dispatch

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[6] This, for example, is the compromise approach suggested by Niagara Mohawk in their 10/6/95 proposal.

to reflect the least-cost method of meeting the constraints while balancing supply and demand. Efficiency and non-discrimination can co-exist with both bilateral transactions and a pool, but only if the ISO is given the appropriate tools to harness rather than handcuff the management of transmission constraints. The Poolco model of an ISO providing a bid-based economic dispatch, charging locational spot prices, and administering a system of transmission congestion contracts is the *only* internally consistent and workable approach that has been described for operating an efficient, non-discriminatory competitive electricity market in the presence of complex network interactions. The separation fallacy, innocuous on the surface, strikes at the heart of the matter by preventing the ISO from getting or using the information essential to accomplish this worthy objective. The separation fallacy is wrong, seriously wrong.