

AN ECONOMIC ANALYSIS OF
BLOCK BILLING FOR NATURAL GAS

J. Stephen Henderson
Senior Institute Economist

THE NATIONAL REGULATORY RESEARCH INSTITUTE
1080 Carmack Road
Columbus, Ohio 43210

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EXECUTIVE SUMMARY

As part of its Final Order 436 the Federal Energy Regulatory Commission (FERC) issued a Notice Requesting Supplemental Comments on Part D of RM 85-1-000 that would establish a block-billing mechanism for jurisdictional sales of natural gas by interstate pipeline companies. Under the proposal, pipelines would divide each customer's bill into two parts, or blocks. Block 1 would consist mostly of the cost of old, price regulated gas, while block 2 would consist of all other categories of gas. Each pipeline customer would be given a fractional allocation of the pipeline's annual block 1 sales.

In comments submitted to the FERC, several organizations asserted that state prorationing laws and multi-vintage contractual obligations prevent proper sequencing of gas takes by pipelines and thereby would prevent block billing from having its intended effect. This assertion is basically not correct. To improve the competitiveness of wholesale gas markets requires that pipeline customers with supply alternatives perceive that the marginal price of the pipeline's supply is the block 2 price. Even with proportional purchasing by the pipeline, distributors that are small in relation to total pipeline sales (say less than 25 percent) will perceive an almost correct marginal price. In particular, the perceived marginal price with prorationing will be a weighted average of block 1 and 2 prices, with most of the weight given to block 2. As an example, a distributor purchasing 10 percent of a pipeline's sales, made up of equal parts of block 1 and 2 supply, would perceive a price based on a 95 weight given to block 2. Such a perception is very close to the FERC intention that pipeline customers base their supply choices, assuming they have some, on the block 2 price. The contention, then, that state prorationing somehow completely negates the effectiveness of block billing is not accurate. The proposal works almost as well with as without prorationing, and is robust with respect to proportional purchasing in this sense.

Many industry observers have suggested that block 2 be divided into a block 2A for market-sensitive contracts and a block 2B for so-called "problem" contracts. The intent of this variation of block billing is to place pressure on recalcitrant producers to renegotiate contracts that pipelines view as being onerous. To be effective, such a proposal would need to include a provision that pipeline customers would have an entitlement to block 2A, similar to the block 1 allocation feature. Most commenters did not suggest such a feature, without which the success of the mechanism would depend mostly on the public embarrassment suffered by producers who have their supplies

included in block 2B. Even with an entitlement to block 2A, however, the ultimate equilibrium of the market would be unaffected by the block 2 split. Both block 2A and 2B are unregulated and, as such, will tend toward a common single price. Splitting block 2 may speed the adjustment process toward this single price equilibrium, but the pressure provided by the original FERC proposal also is likely to facilitate the renegotiation of contracts. The improvement to the dynamic adjustment ability of the market may be only slight. It should be noted that much producer opposition can be traced to an unwillingness to be subjected to the adjustment pressures inherent in the basic proposal; the split version is likely to increase such adjustment pressures.

Most long-term distortions in the natural gas market that can be attributed to rolled-in pricing occur at the retail level because of the difference created between demand price and marginal cost. The FERC cannot hope to eliminate this gap by itself, since retail rates are based, in part, on state regulation. The FERC proposal would improve the competitiveness of wholesale markets, regardless of state action, however. In addition, it should be noted that state regulators would have no opportunity to reduce or eliminate the distortions of retail, rolled-in pricing without block billing at the federal level. In this light, the criticism that state regulation of retail rates could defeat the FERC proposal is misplaced.

The FERC transportation initiative may allow distributors to make supply choices, which, in the absence of block billing, will be based on the pipeline's rolled-in price. This will create opportunities for distributors to select supplies based, in part, on a pipeline's old gas cushion. Such choices are made mainly in pursuit of economic rents, an inefficient behavior that does not benefit society as a whole. Block billing creates the correct perception that the price of block 2 is the relevant price for purchasing decisions and complements the FERC transportation program nicely, in this sense.

Part of the current disequilibrium in the natural gas market is due to changes in economic circumstances, such as the recent reduction in world oil prices and the U.S. economic recession two years ago. Another part of it, however, is an inherent feature of the Natural Gas Policy Act that lifted ceiling prices on about half of the U.S. gas supply on January 1, 1985. Some opposition to block billing by producers is based on the realization that the FERC proposal would facilitate a price reduction of expensive gas supplies. The need for such an adjustment is partially a consequence of the decontrol that allows some producers to receive economic rents thereby creating pressure for other producer prices to decline. Block billing, then, is not the primary reason why some producers are likely to suffer revenue losses in the future. Such losses occur in all markets when surpluses are eliminated.

The FERC allocation formula, based on historical 1978-84 usage, creates hardships in some locations because of shifts that have occurred in demand patterns. The beauty of the FERC proposal is that it works with any set of fixed entitlement proportions. The FERC could allow individual pipelines and their customers the option to negotiate any other equitable allocation formula tailored to their specific circumstance. The mechanism will improve the competitiveness of wholesale markets, regardless of the outcome of such negotiations.

The U. S. Department of Energy (DOE) proposal to raise old gas prices, Docket RM 86-3, may eliminate some market inefficiencies. The DOE has predicted that an additional 34 tcf of old gas reserves could be recovered eventually using enhanced production techniques if old gas prices are raised. Also, elimination of vintage pricing, as proposed in Docket RM 86-3, may reduce the inefficient incentives to drill in-fill wells as a way of circumventing the current NGPA price categories. Raising old gas prices, however, transfers to producers much of the economic rents that the Congress bestowed on consumers in the NGPA. The weighing of these efficiency and equity tradeoffs is likely to be a difficult matter in the FERC deliberations. Many observers view the raising of old gas prices as an alternative to block billing. The two policies could be combined, however, perhaps with a small increase in the just and reasonable price of old gas so as to capture some part of the efficiency benefits just described.

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FOREWORD

At its January 1986 meeting the Board of Directors of the NRRI instructed the staff to prepare within two months an objective economic analysis of block billing for natural gas. This report responds to that directive. It is offered as a contribution to the current debate on this important pricing concept and its public policy application.

Douglas N. Jones, Director
Columbus, Ohio
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Introduction

During 1985 the Federal Energy Regulatory Commission (FERC) initiated a series of far-reaching policy changes affecting the natural gas industry in the U.S. The regulatory process at the FERC has included a Notice of Inquiry (Docket RM 85-1-000), issued in January 1985, on natural gas transportation, rate design, and risk; a Notice of Proposed Rulemaking, in May 1985; a Final Order 436, on October 18, 1985; and a modified Final Order 436-A, on December 23, 1985. The Notice of Proposed Rulemaking (NOPR) had four parts. The final order implemented three parts and delayed the implementation of the fourth part, a new method that interstate pipelines would use for billing wholesale customers such as local distribution companies. The FERC proposed billing mechanism would require each pipeline to divide a customer's bill into two blocks. The first block would encompass old, wellhead-price-regulated gas, which would be allocated to both firm and interruptible customers on the basis of their average consumption during the period from December 1, 1978 to December 31, 1984. All other gas, which consists mostly of gas deregulated under the Natural Gas Policy Act (NGPA), would be billed in a second, separate block. In issuing its final order the FERC requested an additional round of comments on block billing and held a public conference in December 1985. If the block-billing mechanism survives this additional round of scrutiny, it will become effective on July 1, 1986.

State commissions are vitally interested in all parts of the final order and perhaps especially in the block-billing proposal. To assist commissions in their study of these issues The National Regulatory Research Institute (NRRI) has analyzed the block-billing mechanism as well as the commentary offered to the FERC in response to its request in its final order. This analysis and report was requested by the NRRI

Board of Directors at its winter meeting, January 9, 1986. The report has several sections, each dealing with an issue or a group of similar issues. The viewpoints of various commenters are discussed for each issue. This organization highlights the substantive economic arguments for and against block billing.¹ The first section gives an overview of the block-billing proposal, after which a more detailed discussion of particular issues is presented. The intent is to examine the consequences of block billing from the perspective of both the eventual, long-run market equilibrium, and the dynamic adjustment process of reaching such an equilibrium.

Overview of Block Billing

The FERC proposes to phase-in the implementation of block billing on July 1, 1986. The proposed rule (part D of the NOPR), as amended, has a two-part gas rate. In the first block, interstate pipeline companies would recover the costs of so-called "forever-regulated" old gas under sections 104, 106(a), and 109 of the NGPA. The second block would contain the cost of all other gas, most of which is now deregulated or will be deregulated after January 1, 1987. The allocation of block 1 gas would be based on each firm and interruptible customer's fraction of system purchases during the period from December 1, 1978 to December 31, 1984. The status of certain gas supplies, such as the Great Plains Coal Gasification Plant, would be determined on a case-by-case basis. For those pipelines that elect to become voluntary, nondiscriminatory transporters of gas, the FERC proposed to establish a rebuttable presumption that block 2 prices are just and reasonable after a transition period during which all firm customers would be permitted to reduce their contract demands by 100 percent.

¹An alternative organization, not used in this report, would be to present these viewpoints for each industry segment: producers, pipelines, distributors and so on. Interested readers can find a short discussion organized in this alternative manner in "Producers, Consumers Continue to Split Over Merits of Block Billing," Inside FERC, December 2, 1985, pp. 7-9.

According to the FERC, such a presumption would apply only to rates that are reasonably related to block 2 acquisition costs.

It is important to recognize the limitations of part D. The proposal would establish a billing mechanism only. It would not require any particular sequencing of gas from any producer or pipeline. It would not affect or interfere with state regulation of natural gas production under prorationing laws. It would not affect existing contractual arrangements between pipelines and producers. Part D simply prescribes how an interstate pipeline must bill its customers for gas that is sold for resale in interstate commerce.

The block-billing proposal is deceptively simple. This led one commenter to conclude that if block billing is merely a billing mechanism, it has no consequence.² Indeed, it should be noted that it is at least theoretically possible for each customer of each pipeline to be allocated a particular fraction of the pipeline's block 1 gas

²See James E. Rogers, "Oral Statement of James E. Rogers on Behalf of Florida Gas Transmission Company, Transwestern Pipeline Company," presented to the Federal Energy Regulatory Commission, Docket No. RM 85-1-000, Part D, December 12, 1985. At the other extreme, several organizations conveyed their belief to the FERC that block billing is illegal and that a legal challenge would be mustered if the proposal is adopted. Senator Don Nickles from Oklahoma was particularly adamant in his opposition to the concept. See Don Nickles, "Statement of Senator Don Nickles of Oklahoma." The Secretary of Energy and Minerals of New Mexico, Amoco Production Co., and Mobil Oil, among others, said that they would support a legal challenge if the FERC implements Part D. See Paul L. Biderman, "Supplemental Comments of Paul L. Biderman, Secretary of Energy and Minerals for the State of New Mexico, in Opposition to the Proposed Rule," December 11, 1985; Theodore R. Eck, "Summary of Oral Comments by Theodore R. Eck on Behalf of Amoco Production Company," and Mobil Oil Corporation, "Testimony of Mobil Oil Corporation to the Federal Energy Regulatory Commission on Order No. 436," December 12, 1985. All of these comments were filed with the Federal Energy Regulatory Commission in Docket No. RM 85-1-000, Part D. The FERC has carefully addressed many of the legal issues in its Notice Requesting Supplemental Comments. The Commission believes it has the authority to implement block billing, based on the just and reasonable standard in Sections 4(e), 5, and 16 of the Natural Gas Act. In addition, the Commission states that apart from the requirement of rolled-in pricing treatment of Alaskan Gas, "It is clear that nothing in the NGPA prohibits the Commission from permitting rolled-in pricing, incremental pricing or a combination of both in order to implement the mandate of its governing statutes." FERC Notice Requesting Supplemental Comments, 50 Fed. Reg. at 42379.

such that the customer's total gas cost does not change immediately before and after the implementation of block billing. If block 1 gas were allocated in this fashion, all gas rates and retail customer expectations could continue as before if distributors do not change their gas supply mix. This means that the block-billing concept, by itself, does not radically change demand or supply patterns, in the sense that all economic actors could continue to make the same decisions as before, with the same economic consequences.

In reality, block billing would have important effects throughout the natural gas industry. There are two primary reasons for this. First, the block 1 gas allocation based on 1978-84 consumption patterns will cause the gas costs of some pipeline customers to change, in some instances dramatically. Second, the billing statements, by presenting possibly more precise and certainly more plainly apparent prices of block 2 supplies, will encourage wholesale customers to seek lower gas acquisition costs, to the extent that such customers in fact have alternatives. Many do not, of course.

The first of these two reasons is basically a social equity question of how best to distribute the economic rents that accrue from old gas price regulation. The second involves an improvement to the competitive purchasing of gas, which, if it occurs, will be due to two influences. The assignment of property rights to old gas, in effect, insulates a wholesale customer's purchasing decisions from the low prices in block 1. That is, a wholesale customer may perceive that a marginal reduction in purchases from a particular pipeline will occur in block 2 (either mostly or entirely, a point elaborated upon in the following section), thus preserving the customer's right to old gas. The customer does not relinquish the benefit of a pipeline's favorable block 1 price in order to unburden himself from a high block 2 price, for example. The wholesale customer's decisions in this regard are facilitated by the billing statement, which will require the block 2 price to be separately stated, thereby improving the transmission of price signals.

It is also important to recognize that any arbitrary allocation of block 1 gas would serve to insulate that supply, at least partially, from a wholesale customer's purchasing decisions. Economic efficiency would be promoted because purchasing decisions would be responsive mostly to block 2 prices, as opposed to the rolled-in prices used now. The economic efficiency benefits, whether meager or large, are due to this insulating effect of the allocation, no matter how arbitrary. The social justice of some allocations, however, may be considered to be more fair than others. Choices among allocation schemes, then, are mostly a matter of the regulators' sense of social justice. The FERC selection of the historical 1978-84 usage-based allocation is the result of the attention paid to these fairness and equity issues.

The Unimportance of Economic Sequencing

The normal practice of gas supply sequencing is heavily influenced by considerations of state laws regarding prorationing as well as certain contractual provisions that mandate more or less proportional purchases from a variety of multi-vintage wells owned by a single producer. From a short-term perspective, the socially efficient sequence would be to take gas from wells and fields in increasing order of marginal cost, so that least cost supplies are used first. This efficient economic ordering is practiced in the electric utility industry (by economic dispatch), and indeed, would be grounds for a finding of imprudence, in most states, if it were not. Correct order of natural gas supply, however, involves long-term considerations also, such as the correlative rights of property owners with access to a common pool of gas, and state conservation laws designed to prevent waste. Prorationing rules in major producing states are intended to address these long-term considerations.

The reality of prorationing was seized upon by a great many commenters who claimed that prorationing would largely offset the effectiveness of block billing. The viewpoint of spokesmen from

producing states ranged from that of the New Mexico Secretary of Energy and Minerals who said that block billing threatens important state conservation laws to that expressed by Dan Nutter who said that block billing would conflict with state laws that require ratable takes.³ The Kansas Corporation Commission stated that block billing would infringe on traditional state jurisdiction over prorationing.⁴

Commissions in some consuming states and most pipelines and distributors told the FERC that state prorating laws would prevent proper sequencing and thus negate the effectiveness of block billing.⁵ The Transcontinental Gas Pipeline Corporation and the Natural Gas Pipeline Company went further and suggested that the FERC mandate proper sequencing and fight against state prorating laws.⁶

³See Biderman, "Supplemental Comments of Paul L. Biderman"; and Dan Nutter, "Supplemental Comments by Dan Nutter, Petroleum Consultant, on Behalf of Doyle Hartman, Oil Operator, to the Notice of Proposed Rulemaking," presented to the Federal Energy Regulatory Commission, Docket No. RM 85-1-000, Part D.

⁴See State Corporation Commission of the State of Kansas, "Statement of the State Corporation Commission of the State of Kansas," presented to the Federal Energy Regulatory Commission, Docket No. RM 85-1-000, Part D.

⁵See Michael B. Day, "Comments of the People of the State of California and the Public Utilities Commission of the State of California," December 11, 1985; George H. Lawrence and Michael I. German, "Written Comments of the American Gas Association on the Notice Requesting Supplemental Comments on Block Billing," November 18, 1985; Roger C. Post, "Supplemental Comments on Behalf of the Columbia Gas Distribution Companies"; and John H. Cheatham, III, "Comments and Requests for Clarification of the Interstate Natural Gas Association of America," November 18, 1985. These comments were presented to the Federal Energy Regulatory Commission in Docket No. RM 85-1-000, Part D.

⁶See Thomas F. Ryan, Jr., "Comments of Transcontinental Gas Pipeline Corporation in Response to Notice Requesting Supplemental Comments," presented to the Federal Energy Regulatory Commission, Docket No. RM 85-1-000, Part D, November 18, 1985; and Charles R. Eberst, Jr., "Statement of Charles R. Eberst, Jr. on Block Billing Proposal," presented to the Federal Energy Regulatory Commission, Docket No. RM 85-1-000, Part D.

In its own context, each of these comments has some validity. It is true, for example, that proper sequencing most likely would improve society's overall resource allocation in the short term and that state prorating laws prevent this, or at least do not encourage it. In the view of the author, however, all of these comments about sequencing are mostly irrelevant to the central question of whether block billing would be effective. The FERC jurisdiction is over sales for resale, and, as such, the only stage of the natural gas production process that the FERC could hope to improve is wholesale transactions. Greater competitiveness and more efficient buying at the juncture of pipelines and distributors would promote economic efficiency. The essential point missed by all commenters is that block billing accomplishes this almost as well whether or not supplies are properly sequenced. Block billing works best, to be sure, under correct sequencing. But perhaps more importantly, it works almost as well when block 1 and block 2 supplies are taken proportionally by the interstate pipelines. The reason is that each distributor or other pipeline customer consumes only a small fraction of a given pipeline's total sales. A technical discussion of this point is in the appendix for interested readers. A more intuitive explanation follows, in which an example is used to make the discussion more concrete.

Suppose that a distributor has supply alternatives and is interested in comparing prices. Under block billing, his bill will have two parts. Each is the product of the price and volume purchased, with the price of block 1 being smaller than that of block 2. The distributor purchases 200 units of gas (perhaps measured in millions of mcf) from a pipeline that delivers 2000 units to all its customers. Half of the pipeline supply is categorized as block 1 at \$1.00 per mcf, and the other half is block 2 supply, currently costing \$4.00 per mcf. The pipeline's rolled-in price to the distributor would be \$2.50 per mcf. Suppose the distributor has an alternative supply source costing \$3.00 per mcf. And finally suppose that the distributor's allocation of

block 1 is more or less the same as its current size in relation to the pipeline's total sales, that is 10 percent.⁷

The question to be addressed is whether or not the distributor can correctly ascertain that substituting gas from the alternative supplier at \$3.00 for the \$4.00 block 2 gas of the pipeline would be in his own self interest. The most important aspect of this question is whether the distributor's self interest leads to the correct decision even when the distributor understands that the pipeline is forced by state prorationing rules and multi-vintage contracts to take block 1 and block 2 supplies proportionally.

There is little question about the outcome if the pipeline properly sequences its purchases (block 1 first) and the distributor correctly understands that proper sequencing prevails. All observers agree that under such circumstances, block 2 would become the marginal supply from the pipeline and its price would be conveyed properly under the FERC block billing proposal. The distributor's self interest would be to purchase gas from the alternative supplier at \$3.00 and reduce its purchases of the \$4.00 block 2 supply. If enough distributors were able to make such choices, competitive pressure would tend to reduce the price differential of \$1.00 per mcf. If there were no limit to the competition (if distributors could reduce their contract demand to zero, and wished to do so), the price difference would be eliminated, eventually.

Block billing, then, improves the competitive nature of wholesale gas markets if pipeline purchases are properly sequenced. The important question is, To what extent is the mechanism flawed when pipelines cannot correctly order their purchases? The answer is, Very little. With prorationing, the distributor's perceived marginal price will not be the pipeline's rolled-in price. This is because the

⁷The size of this allocation fraction is not important--that it be perceived to be constant, by the distributor, is.

distributor has only a fractional allocation of the pipeline's block 1 gas. The distributor's perceived price depends on this fraction, as long as he also perceives that his action of reducing his purchases from the pipeline is independent of the actions of other pipeline customers. Some of the other customers may be positioned to take advantage of alternative supplies, like our hypothetical distributor, and some may not be. As long as each customer acts to optimize his supply mix independently of all other pipeline customers, the FERC proposal works even with prorationing. Jumping ahead to the end of this analysis, under such circumstances the distributor's perceived marginal price would be a weighted average of the prices of the two blocks. The weight given to block 1 is the distributor's fixed fractional allocation multiplied by the proportionality fraction that expresses the pipeline's obligation to take block 1 supplies in relation to its total takes.

In the hypothetical example, the distributor is allocated 10 percent of the pipeline's block 1 supplies. Half of the pipeline's supplies are from block 1 sources. Suppose that as the pipeline adjusts its takes at the margin, it must take one-half of its supplies from block 1. (That is, suppose that the average take and the marginal take of block 1 gas are both $1/2$. If these two numbers were different, only the marginal take would be relevant to the argument.) The weight given to the block 1 price, then, is 5 percent, which is the product of the distributor's 10 percent allocation and the marginal prorationing ($1/2$) that applies to block 1 gas. The weight the distributor would give to the block 2 price is the complement of the block 1 weight, or 95 percent. In the example, then, the distributor's perception of the marginal price of purchases from the pipeline is \$3.85, which is the weighted average of \$1.00 and \$4.00 using 5 and 95 percent weights respectively. The reader should note that this perceived price of \$3.85 is the correct perception, in actuality. This perceived marginal price is very close to the block 2 price as long as the distributor is small in relation to the pipeline.

The exact reason why \$3.85 is perceived as the marginal price can be illustrated by examining the hypothetical example in detail. The distributor initially purchases 200 units from the pipeline and has claim to 10 percent of the pipeline's block 1 supplies, or 100 units (10 percent of 1000 units). The distributor's total cost of gas is \$500 (200 x \$2.50). Suppose the distributor reduces his purchases by 20 units to 180 units of gas. The distributor knows that the pipeline will reduce its takes from producers proportionally. So the 20 unit decline in the pipeline's takes will be split so as to reduce both block 1 and block 2 by 10 units. The pipeline would then take 990 units from each block. The distributor knows that he has a proportional claim to the 990 units of low-priced block 1 gas, so that he will be billed for 10 percent of 990 units, or 99 units, of block 1 gas. The remaining purchases, 81 units (180 minus 99), will be billed at block 2 prices. The total cost of the 180 units, then, will be \$423.00 ((99 x 1) + (81 x 4)). The reduction of 20 units has saved the distributor \$77.00 (\$500 minus \$423.00), which reflects a marginal price of \$3.85, as claimed. The same logic applies to a demand increase of 20 units, as well.

This example makes clear why the perceived marginal price remains close to the block 2 price, even with prorationing. Each distributor can correctly anticipate that his own purchasing cut-backs are only a small part of the pipeline's total sales. After his cut-back, his claim to block 1 supplies will drop but not in proportion to his reduction. He recognizes that his own mix of block 1 and block 2 gas will be tilted in favor of block 1 after his reduction. In the example, the distributor's fraction of block 1 is 50 percent before and 55 (99/180) percent after the cut-back.

From the point of view of promoting the competitive efficiency of wholesale markets, the FERC block-billing proposal works almost as well when there is producer prorationing, as when there is proper sequencing. The perceived marginal price of \$3.85 means that the distributor would view the pipeline's supplies as being more expensive,

at the margin, than the \$3.00 alternative. The distributor would make the socially correct decision in this instance, despite the fact that the average price of pipeline supplies is only \$2.50. The reality of producer prorationing does not have the effect of making the distributors' marginal price equal the pipeline's average price, as implicitly suggested in the comments submitted to the FERC.

The viewpoint of competitive efficiency, to be sure, is not all that matters in this situation. For instance, the cut-back by a single distributor has repercussions on other pipeline customers. Because a distributor or any other customer maintains the same fractional claim on a pipeline's block 1 supplies, that which is available for others will be smaller after a cut-back by any single customer. In the example, the initial split of the 1000 units of pipeline block 1 supply is 100 for the hypothetical distributor, and 900 for all others. After the distributor's reduction of 20 units, the distributor claims 99 out of 990 units of block 1 gas, leaving 891 units for all others. Hence, the distributor's action causes a reduction of 19 block 1 units that are allocated to others. This raises the average price of gas to all remaining pipeline customers. In effect, there is a pecuniary, negative externality imposed on others by the action taken by any one pipeline customer.⁸

It is important to note that the externality just described is purely pecuniary and, as such, has no effect on any distributor's purchasing decisions. There are no efficiency consequences, then, of the phenomenon, and hence the claim can be made that competitive efficiency of wholesale markets is enhanced by block billing almost as well with prorationing, as with proper sequencing.

The pecuniary nature of the externality, nonetheless, has nontrivial ramifications for social equity and justice. Captive distributors and other customers with no supply alternatives may point

⁸The aggregate externality in this case is $-\$1.35$ per mcf. That is, for every unit of cut-back made by the hypothetical distributor, the aggregate bills of the remaining customers go up by $\$1.35$.

out the injustice of paying a higher cost because of supply opportunities available to, in their view, a fortunate few. Although it may be difficult for such captive distributors to recognize, these inequitable consequences are not permanent. Indeed, the action of those with supply alternatives is precisely that which is needed to bring prices into equilibrium again. The competitive pressure, in part, will tend to bring down the pipeline's block 2 prices, creating a positive benefit for all, including captive distributors. The opposition to block billing by some customers on the basis of the negative externality would be short-sighted.

The analysis thus far has been based on the premise that pipelines take block 1 and block 2 proportionally. Under proper sequencing, the marginal take of block 1 supplies would be zero, that is, block 1 gas would be purchased first and all marginal adjustments would occur within block 2.⁹ With correct sequencing, then, the marginal price would be that of block 2, and the negative externality would not occur at all. The reason is that the pipeline's block 1 take would not be reduced in response to any customer's cut-back, and therefore, it would not have any spillover consequences on others.

In this light, an important empirical question is the extent to which most pipelines can and do properly sequence their purchases. The recent U.S. Supreme Court ruling in the Transco v. State Oil and Gas Board of Mississippi case is germane to this question.¹⁰ In that ruling, the Court prevents the Mississippi Board from imposing ratable takes on Transco within a common pool of gas. This allows Transco to sequence its takes more in accordance with short-term efficiency considerations, possibly subject to contractual constraints that prevent a complete economic ordering. The issue is not completely settled, however. The Court decided the matter by a 5-4 vote, with the dissent pointing out that a ratable-take rule promotes efficiency when

⁹This presumes that customers do not reduce their purchases by more than the pipeline's total block 2 purchases. If this happens, which seems highly unlikely, block 1 would become the marginal supply.

¹⁰This case is discussed in Inside FERC, January 27, 1986, p. 1.

applied to a common pool, a reference to important considerations about long-term property rights.

The extent of prorationing or correct sequencing in a pipeline's future purchasing practices is by no means obvious, then. It appears that pipelines may have considerable discretion in arranging their sequencing so as to promote short-term efficiency. If so, the FERC block-billing proposal would promote competitiveness in wholesale markets with few pecuniary spillovers. Even if prorationing prevails, however, the FERC proposal would impose strong competitive discipline on wholesale markets, in a subtle manner that has not been acknowledged in the comments submitted to the FERC.

Should Block 2 Be Subdivided?

A large number of comments submitted to the FERC contained the suggestion that the concept of block billing be carried further than proposed in part D of RM 85-1-000. These commenters recommend dividing block 2 itself into 2 parts. Block 2A would contain so-called market-responsive contracts, while block 2B would consist of nonresponsive or "problem" contracts. This idea was advocated by the California and Wisconsin Commissions and many distribution and pipeline companies.¹¹ The process for identifying which contracts belong in which category is not made clear in many of the comments. For the purposes of this discussion, a very sensible and straightforward procedure, as explained by Dayton Power and Light, would be to allow each pipeline company to choose its own definition of market responsiveness and thus assign contracts to blocks 2A and 2B according to its own circumstances.

¹¹A partial list of these organizations includes the Interstate Natural Gas Association of America, the American Gas Association, the Associated Gas Distributors, the United Distribution Companies, Brooklyn Union Gas Company, Entex, Florida Gas Transmission Company, Trans Western Pipeline Company, Natural Gas Pipeline Company, Tennessee Gas Pipeline Company, and Dayton Power and Light Company. Their comments are filed with the FERC in Docket No. RM 85-1-000, Part D.

The purpose of the block 2A/2B concept is to place pressure to renegotiate on those producers whose contracts the pipeline finds particularly onerous and the gas unmarketable. The exact form in which such pressure will be manifested is not clearly stated. Indeed, many of the comments leave the reader with the impression that the harsh glare of public attention focused on the price of block 2B supplies will persuade such recalcitrant producers to negotiate seriously and bring their prices down. This is a form of "jawboning" that depends, in part, on public embarrassment to achieve the goal. A purely economic perspective suggests that such a strategy is not likely to be successful. The efficacy of this kind of discipline in reducing prices perhaps should not be discounted entirely, however, particularly in light of the number of commenters who believe it to be an important influence. But, public indignation toward corporations with high prices has a very mixed, if not poor, record in achieving the desired results. If this is the major source of price discipline intended by the block 2A/2B proposal, its chances of success do not seem to be particularly high.

The other possible source of price discipline is that which is discussed in the previous section--distributors choosing least-cost supplies. The action of a pipeline customer reducing his purchases enforces a discipline on producers which is an order of magnitude stronger than mere jawboning. The question to be addressed in this section is whether subdividing block 2 improves the competitiveness of wholesale markets by improving the purchasing decisions of those pipeline customers with supply alternatives. Again, skipping ahead to the conclusion, the answer is slightly more complicated than that given for block billing in the previous section, but is straightforward nonetheless. If the block 2A/2B billing mechanism contains a fractional allocation of the pipelines' block 2A supplies for each customer (perhaps based on historical usage, as is the case for block 1), the subdivision would improve the competitiveness of wholesale markets, in that the customer's marginal price would be that of block

2B supplies. If the block 2A/2B billing procedure contains no such customer entitlement, it creates little or no competitive incentive for a wholesale customer to choose alternate sources of supply, other than that already inherent in the FERC proposal. Only three commenters suggested that customers be given an entitlement to block 2A.¹² Without such an entitlement, the bifurcation of block 2 improves the FERC proposal only slightly, if at all. The burden of administering an additional block that does not improve the competitiveness of wholesale markets is likely to make the block 2A/2B concept unattractive to the FERC.

Elaborating on this conclusion, it is useful to recall that the FERC proposal improves the competitiveness of wholesale price signals for two reasons--there is a two-part bill and an entitlement to supplies in block 1. The beauty and simplicity of the FERC proposal is that it combines both elements, nothing more nor less. Without the entitlement, the proposal truly would be a mere billing procedure with no consequences, because a customer's marginal price would be the rolled-in price. The fact that the entitlement is stated as a fraction (and not as an absolute volume of gas) means that state prorationing laws may reduce the procedure's effectiveness slightly, but it remains very effective, indeed, in causing the distributor to perceive that the marginal price is very close to the price of block 2 gas--the intention of the FERC. If the entitlement were stated in absolute terms, prorationing would not reduce the perceived marginal price at all. It is the customer's entitlement, then, that makes the FERC proposal work, and it is also this entitlement that makes the proposal robust with respect to prorationing.

If a similar, fractional entitlement to block 2A supplies were given to customers, then the bifurcation of block 2 would improve matters, in the sense of causing a pipeline's customer to perceive the

¹²See the comments submitted by the Wisconsin Public Service Commission, Brooklyn Union Gas Company, and the Associated Gas Distributors filed with the Federal Energy Regulatory Commission in Docket RM 85-1-000, Part D.

price of block 2B as the marginal price. Suppose the previous numerical example is expanded to include the block 2A/2B concept. In the previous example, the price of block 2 supplies is \$4.00 per mcf. Suppose block 2 consists of equal parts of block 2A at \$3.00 per mcf and block 2B at \$5.00 per mcf.

In this example, wholesale market competitiveness is improved to the extent that \$5.00 is perceived as the marginal price. Four possible cases can be created depending on whether or not customers are entitled to a fraction of the pipeline's block 2A supplies, and also on whether the pipeline can correctly sequence its purchases or must take gas proportionally from all sources. Table 1 summarizes a wholesale customer's perceived marginal price in each of these four circumstances. The details of the calculations are in the appendix. As described in the previous section, and for the same reasons, the perceived price is close to the block 2B price of \$5.00, as desired, as long as each customer has an entitlement to block 2A gas. In the absence of such an entitlement, however, the perceived marginal price is close to the average price of blocks 2A and 2B, which is \$4.00, whether or not the sequencing is correct. The \$4.00 price also would be perceived under the FERC basic proposal, so the splitting of block 2 in this case adds little to the basic block billing concept.

TABLE 1
WHOLESALE CUSTOMER'S PERCEIVED MARGINAL PRICE
IN FOUR CIRCUMSTANCES

	An Entitlement to Block 2A	
	With	Without
Correct Sequencing	\$5.00	4.08
With Prorationing	4.75	3.85

Thus far, the discussion has focused on the distributor's perception of the marginal price, and how this perception is improved under various circumstances. There are two possible economic consequences of such an improvement. It might affect the market's ultimate equilibrium or it might change the market's adjustment speed in reaching its equilibrium or both. The new equilibrium itself is not likely to be much different if block 2 is split. Both block 2A and 2B would consist of unregulated gas, free to seek its own price level. The eventual equilibrium will have the same price for all unregulated gas, unless there are impediments to competing away the price differentials that currently exist between the two blocks. Reaching such a single, unregulated price equilibrium may take several years, but it is true nonetheless that the same price will ultimately prevail for both block 2A and 2B in a competitive market.

Although splitting block 2 does not change the equilibrium, the concept could be beneficial to the extent that it improves upon the market's adjustment speed. This improvement should be evaluated in comparison to the original FERC proposal which creates substantial pressure on the industry to begin to seek such a balance. With an entitlement to block 2A gas, the adjustment may be faster, but without it, there is little difference between the FERC proposal and the split-block version.

Retail Pricing Issues

The FERC block-billing proposal applies only to wholesale transactions under the FERC jurisdiction. It does not affect state regulation of the retail rates of local distribution companies. Such retail rates are currently based on rolled-in pricing. Whether state commissions would choose to follow the FERC example and allocate block 1 gas to particular end users would be decided, of course, by each commission.

The FERC received several comments to the effect that the continuation of rolled-in pricing at the retail level would prevent

wholesale block billing from achieving the FERC objective.¹³ A variation of this comment was that the FERC block-billing proposal would succeed only in transferring the old gas cushion to distributors, with the implication that the distortions in the gas market would be merely shifted to the distribution level.

This criticism is difficult to evaluate for a variety of reasons. For one thing, there is a nontrivial difference between improving the efficiency of wholesale markets and improving retail market efficiency. Wholesale customers (who are not end users) can minimize their gas purchase costs by comparing the marginal prices of alternative supplies (holding constant such matters as service reliability). The average price does not matter to a distributor attempting to minimize total gas costs. Because the distributor merely transports the gas and is not an end user of gas, there is nothing about the distributor's demand function which would prevent the marginal price from being that upon which purchasing decisions are made. The same may not be true for retail markets. For many long-term investments in gas-burning equipment, lifetime total costs matter and hence the end user's average price may impinge on his long-run demand for gas, even if block billing were instituted at the retail level. Some complex combination, then, of average price in long-run capital equipment decisions and marginal price in short-run gas usage decisions may determine the demand of end users. There is no similar reason to suspect that wholesale purchasing decisions would depend on any price other than marginal.

¹³See, as example, the following comments: Cheatham, "Comments and Requests for Clarification of the Interstate Natural Gas Association of America"; Mobil Oil Corporation, "Testimony of Mobil Oil Corporation"; Edward J. Grenier, Jr., "Hearing Statement of Edward J. Grenier, Jr. on Behalf of the Process Gas Consumers Group, American Iron and Steel Institute, Association of Businesses Advocating Tariff Equity, and Georgia Industrial Group," December 11, 1985; and John P. Murphy, "Statement of John P. Murphy on Behalf of the American Paper Institute, Inc., Opposing Block Billing." All of these comments were filed with the Federal Energy Regulatory Commission in Docket No. RM 85-1-000, Part D.

In its Notice Requesting Supplemental Comments on block billing, the FERC clearly recognized that its proposal would affect neither state prorationing procedures nor state jurisdiction over retail rates. The FERC can aspire only to improve the competitiveness of wholesale markets. It cannot require any particular form of pricing at the retail level.

Most of the market distortions that can be attributed to rolled-in pricing occur at the retail level. In particular, the demand price is smaller than the supply price. That is, the consumer's marginal benefit from the incremental unit consumed is less than the marginal resource cost given up by society in producing such a unit. This is because end users are given a rolled-in price. Wholesale block billing can eliminate much of the differences in block 2 prices between pipelines and thus make the wholesale playing field level where it matters, which is to say at the margin. Wholesale block billing cannot eliminate differences in average prices between pipelines that are due to differences in old gas supplies, however. If retail prices remain rolled-in, the distortions associated with the practice will remain, also. In this case, the principal virtue of wholesale block billing is that it facilitates the dynamic process by which the natural gas market adjusts from one rolled-in price equilibrium to another. This is not, by any means, a trivial advantage. Such an improvement in the process of sending price signals between the producer and end user could help the market to adjust efficiently to new circumstances.

Most importantly, however, wholesale block billing must logically precede retail block billing. No state commission could institute retail block billing for distributors served by interstate pipelines in the absence of the FERC wholesale block-billing mechanism. A distributor could not give an entitlement to low cost gas to his customers without having such an entitlement himself. A distributor having a claim to a fraction of his supplier's block 1 gas could pass on this benefit to retail customers in the form of an inverted or increasing block rate structure, for example. The tail-block price

faced by retail customers could be set to correspond to the distributor's marginal supply price. Although it is true that state regulators and local distributors could adopt increasing block rates even in the absence of wholesale block billing (and some have), it would be difficult to design rational rates in such a circumstance. Without wholesale block billing, the distributor's marginal supply price paid to an interstate pipeline is the rolled-in price. Fashioning an inverted rate structure that has such a rolled-in price as the tail block would not improve the efficiency of the price signal conveyed to end users.

The statement that the ultimate purpose of the FERC in adopting block billing would be mostly thwarted by the continuation of retail rolled-in pricing, then, is valid. This is not a reason, however, for not adopting the FERC proposal. Without wholesale block billing, there is no possibility that state commissions can improve marginal price signals. Even if state commissions decline to adopt some form of retail block billing, the FERC proposal would improve the competitiveness of wholesale markets, a not insubstantial benefit.

Wholesale Competition in the Absence of Block Billing

The FERC is encouraging pipelines and their wholesale customers to arrange matters so that customers have supply choices. Suppose (1) the transportation program succeeds, in that most major pipelines decide to accept the FERC offer to become nondiscriminatory contract carriers, and (2) block billing is not adopted. Wholesale customers, then, would base purchasing decisions on their perception of the marginal price of each supply alternative. Because pipeline rates would continue to be based on rolled-in pricing, distributors and direct industrial customers would perceive the rolled-in rate to be the marginal price. A distributor with options would select pipeline sources with the lowest rolled-in price. Indeed, distributors and some industrial customers might be tempted to construct small connection spurs so as to benefit from another pipeline's favorable, low rolled-in price. To

the extent that the pipeline's rates are low due to a large amount of block 1 regulated gas, such behavior is clearly inefficient. It is the mere pursuit of economic rents. The distributor's choices, in such circumstances, are largely based on the desire to get a share of another pipeline's low-price, old gas supply.

The FERC block-billing proposal, on the other hand, complements the transportation program nicely, in the sense that it correctly creates the perception on the part of distributors that a pipeline's block 2 price is the marginal price. If a distributor elects to "go after" some alternative pipeline (after the distributor has exercised its 15 percent contract demand reduction right, for example), it does so in order to receive the pipeline's block 2 supplies and prices, and not as a way of seeking the rents embedded in that pipeline's block 1 sources. The transportation program without block billing seems likely to invite nontrivial amounts of such rent-seeking activities.

Three Versions of a Regulated Pricing Equilibrium

It is instructive to compare the nature of the natural gas market's equilibrium under three circumstances: (1) total wellhead price regulation combined with rolled-in pricing, (2) partial wellhead price regulation combined with rolled-in pricing, and (3) partial wellhead price regulation combined with some version of block billing at the retail level. The first circumstance corresponds roughly to the situation before January 1, 1985. The second circumstance is intended to correspond to current conditions (with or without wholesale block billing, as we shall see), while the final circumstance is a useful benchmark describing what happens if marginal prices are conveyed to end users. The analysis is presented graphically and is an elaboration of the technique used to describe a rolled-in pricing equilibrium in a previous NRRI report.¹⁴ The purpose of this section is to compare

¹⁴Kevin A. Kelly, J. Stephen Henderson, et al., State Regulatory Options for Dealing with Natural Gas Wellhead Price Deregulation, NRRI-83-7 (Columbus, Ohio: The National Regulatory Research Institute, 1983), pp. 40-51.

annual production volumes under the three circumstances, where economic conditions are stable. This is a hypothetical exercise, the conclusions of which can be found in the final paragraph of this section.

Since the purpose here is to compare equilibria, a simple expositional device is used. The assumption shall be made that producer price regulation is conducted perfectly over any market segment to which it is applied. In particular, each producer receives a price equal to his own marginal cost and supplies are brought to market in the correct, increasing cost order. This exercise is useful because it can be graphed easily. It can be compared, then, to what happens when part of the producing sector is deregulated. The qualitative conclusion does not change if the more realistic step-by-step price ceilings of the Natural Gas Policy Act are used; however, such complex detail cannot be depicted graphically.

Figure 1 shows the nature of a rolled-in pricing equilibrium, with increasing costs and producer price regulation. With perfect regulation, each producer receives a different price, one equal to his own marginal cost. Consumers, under rolled-in pricing, pay the average of this constellation of producer prices. For these to be in equilibrium with no shortages requires that two conditions be met. First, the final unit of gas demanded at the average price must be supplied by the most expensive producer. Second, the total payments by consumers must equal the total receipts of producers. The equilibrium depicted in figure 1 satisfies these conditions, with the understanding that consumer payments are net of transportation fees.

The rolled-in price in figure 1 is P_1 and the quantity Q_1 is traded in the market. The total payment made by consumers for gas is the product of P_1 and Q_1 or the area OB₁EF. Each producer receives his own marginal cost and with perfect regulation these receipts would equal the area under the supply curve up to Q_1 . This is the trapezoid OADF. Figure 1 depicts a rolled-in pricing equilibrium because it has been constructed so that these two areas are equal. An alternative way

of viewing matters is to note that the equality of the two areas just described means that triangles ABC and CDE are also equal. The area ABC corresponds, in some sense, to the old gas cushion whereby the

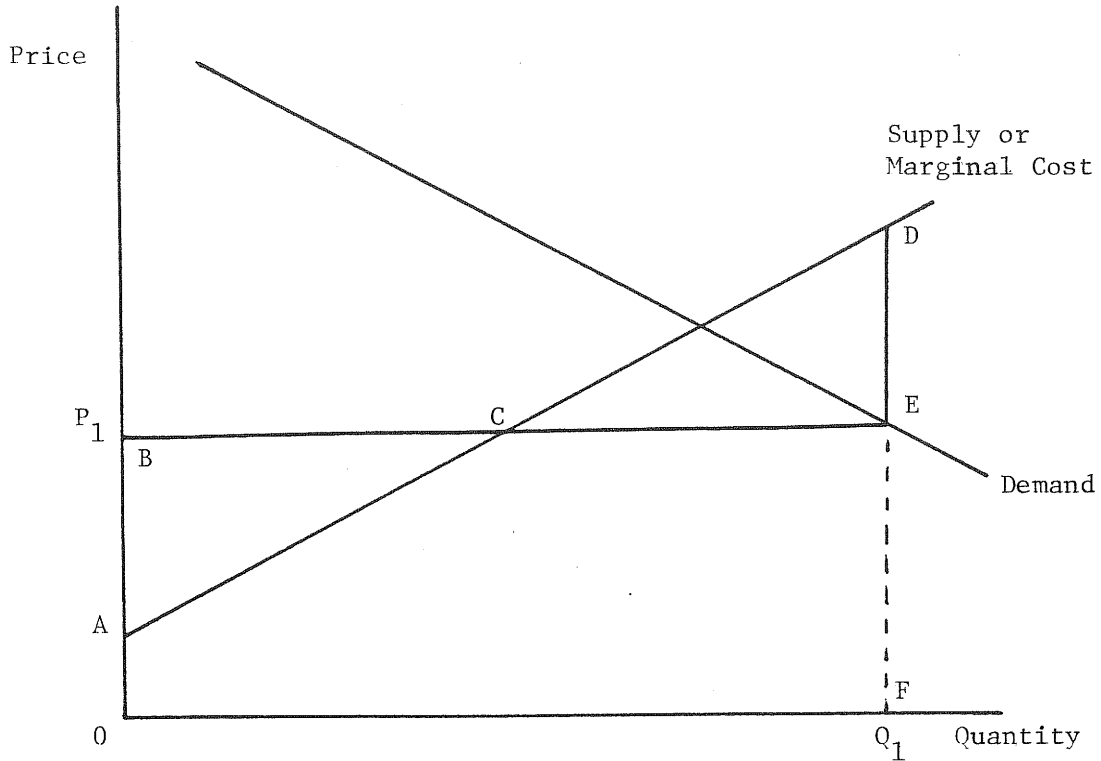


Fig. 1. A rolled-in pricing equilibrium

producer receives less than the average price paid by end users. The area CDE, likewise, can be interpreted as payments for expensive gas in excess of the average price. In this interpretation, the old gas cushion is exactly offset by the cost of expensive gas. Despite the fact that old and expensive gas costs are in balance, the market remains permanently distorted by the rolled-in pricing policy. At the margin where Q_1 is traded, the marginal cost of the producer (vertical distance DF) is higher than the marginal benefit or willingness to pay of consumers (the vertical distance EF). The gap between the supply

and demand schedules, vertical distance DE, is the value of the marginal distortion in this market equilibrium.

Figure 1 is intended to be a hypothetical rendition of the natural gas market with perfect regulation and stable economic conditions. During the 1982 to 1984 time period, market conditions were not stable in fact. Demand for natural gas was depressed by a general economic recession. The market continues to struggle to regain its balance even now in 1986. Despite this reality, suppose for a moment that the equilibrium in figure 1 had prevailed in late 1984. After January 1, 1985, several categories of gas were freed from wellhead price controls. The nature of the equilibrium changes with such partial decontrol.

Figure 2 replicates the equilibrium in figure 1 for purposes of comparison. The price P_1 and quantity Q_1 represent the fully-

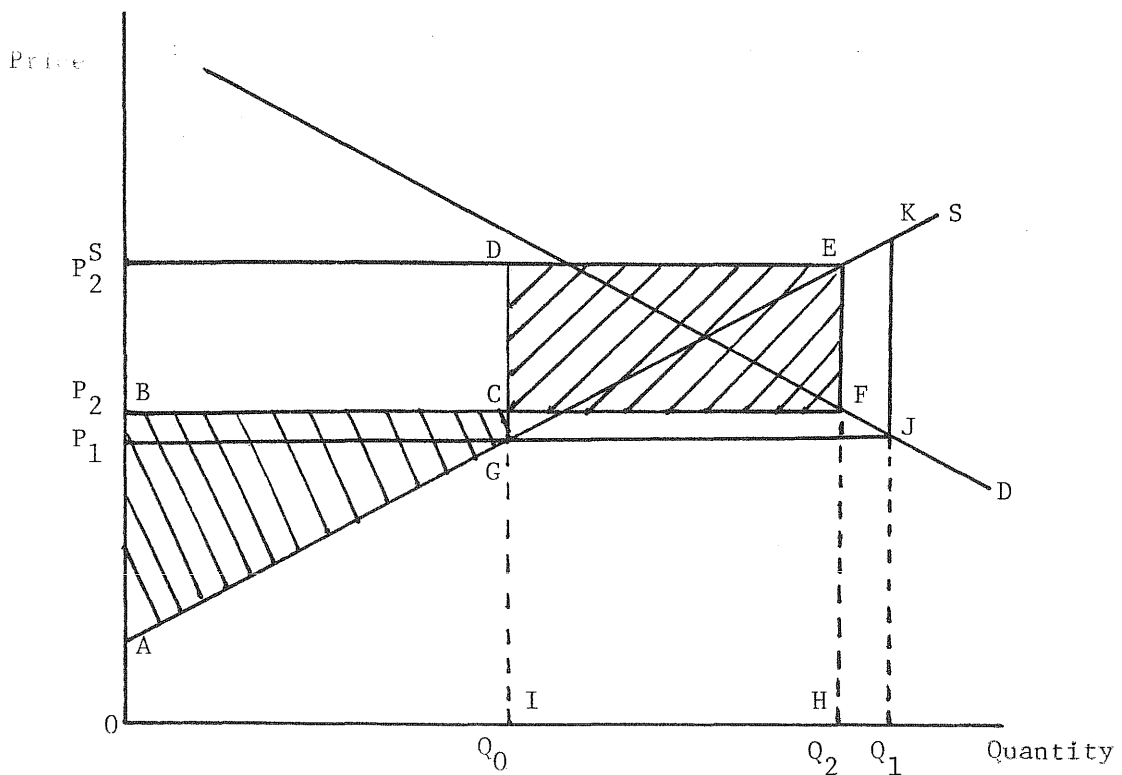


Fig. 2. A rolled-in pricing equilibrium under partial decontrol

regulated, rolled-in price equilibrium in figure 1. In a partially regulated setting some gas remains subject to ceiling prices, while the remaining gas is not regulated at all. In figure 2, suppose that the regulated wells happen to be those arrayed from the origin to Q_0 . (The placement of Q_0 will not affect the following argument.) Producers along the supply curve, then, from A to G receive marginal cost under old gas controls. This corresponds to the idea of block 1 gas. Beyond the point G, prices are deregulated. There is nothing to prevent any producer from raising his price as high as the market will bear. Eventually, competition among producers will yield a single price, more or less, for all gas in excess of Q_0 . The single price for what could be called block 2 gas must be greater than or equal to the marginal cost for all supplies offered in the unregulated portion of the market because no producer would be willing to sell the gas at less than marginal cost.

Suppose the prices of the perfectly regulated block 1 supplies and the single price of the decontrolled block 2 supplies are averaged together to create a rolled-in price to be paid by consumers. This corresponds to the situation after January 1, 1985. The new equilibrium may be reached only after several years of adjustment. The ultimate equilibrium, as shown in figure 2, would tend to have less total sales, at a higher rolled-in price, and with a block 2 producer price somewhat smaller than the marginal cost of the most expensive well in use under the fully regulated equilibrium in figure 1.

The effects just described are implied by this model of the market's equilibrium for a very simple reason. With partial decontrol, it would be true that at least some producers will be paid more than their marginal cost, if the ceiling price had previously been effective. Producers who own wells that have marginal costs just to the right of point G in figure 2 are examples. These are the fortunate well owners who have the cheapest sources among the deregulated supplies. Since at least some suppliers are paid more under partial decontrol than under full regulation, it must be the case that the consumer's rolled-in price would increase.

The partial decontrol, rolled-in price equilibrium must obey the same two rules that were given for the previous case--quantity supplied and demanded must be equal, and total consumer payments must equal total producer receipts. The new rolled-in price in figure 2 that accomplishes these two things is P_2 , with the block 2 producer price being P_2^S . Consumer payments are measured by the area OBFH, while producers receive OAGI in block 1, plus IDEH in block 2. The equality of payments and total receipts requires that area ABCG equal CDEF. It must be the case that the quantity traded in the market, Q_2 , under this partial decontrol equilibrium, is less than that traded under full regulation, Q_2 . This is because P_2 must be higher than P_1 (some gas costs consumers more) and hence point F on the demand curve is associated with a smaller quantity than point J.

The important conclusion of this comparative-static exercise is that the effect of partial decontrol (holding constant other influences) is to reduce the amount of natural gas bought and sold from Q_1 to Q_2 . From the viewpoint of society as a whole, the market distortion has been reduced by the partial decontrol. The marginal distortion in figure 2 is reduced from the distance KJ to EF, for example. Some marginal consumers, perhaps boilers, drop out of the gas market and some high cost marginal producers that could sell gas under the full-control regime would eventually be forced out of a correctly sequenced, partially-regulated market. The shift in policy, then, from a fully to partially regulated wellhead market, by itself, would tend to force marginal producers, along the supply curve from point E to K, out of the market.

The reality is more complicated than this simple model, of course. Producers from point E to K with working wells would be willing to accept a price lower than the long-run marginal cost depicted in figure 2, since much of the capital investment would be fixed. In such a case, there would be excess capacity that could be rationed in ways other than by price--proportionally for example. Until the excess capacity is absorbed by demand growth over time, the actual equilibrium

would be somewhat different from the correctly sequenced version shown in figure 2. Even so, the conclusion remains that the NGPA timetable for partial decontrol contains an inherent tendency to shrink the gas market as gas is deregulated. The industry has experienced, in addition, a shift in demand because of oil prices and the U.S. economy, both of which have allowed the so-called gas bubble to endure for several years.

The process of adjusting to the new equilibrium under partial decontrol is not an easy one. The difficulty is the market determination of the single price for unregulated supplies, P_2^S . Producers do not know this price at the outset, and, in addition, they may have signed long-term contracts at a price closer to marginal cost. Renegotiating such contracts may take several years. The speed of the dynamic adjustment process will be faster to the extent that the wholesale market is more competitive, at both the producer-pipeline and pipeline-distributor junctures. A severely flawed market may move toward the single, unregulated price very slowly, indeed.

The partial-decontrol equilibrium in figure 2 is the same whether or not the FERC were to adopt wholesale block billing, as long as prices are rolled in at the retail level. That is, the EF distortion in figure 2 is due to a difference in the price paid by end users and that paid to unregulated suppliers. The existence of that distortion depends solely on whether retail prices are rolled-in. The FERC block-billing proposal, then, does not affect the ultimate equilibrium towards which the industry is aimed. Wholesale block billing, may dramatically speed up the adjustment process, but will not change the equilibrium itself.

If the FERC were to adopt wholesale block billing, state commissions may follow suit and establish entitlements to block 1 gas for specific customer groups or perhaps adopt inverted rate structures so as to make the marginal retail price equal the price of block 2 supplies. The ultimate market equilibrium changes substantially if

block billing were adopted for all retail customers. This case is depicted in figure 3 with the retail block-billing equilibrium having P_3 as the block 2 or marginal price and Q_3 units of gas being traded. As before, block 1 is perfectly regulated and includes all sales up to Q_0 . A single unregulated price would prevail for sales beyond Q_0 , that is, block 2 sales. With retail block billing, the block 2 price would also become the end-user's marginal price. The only equilibrium possible (assuming that end users base consumption decisions on marginal and not average price) in these circumstances is where the supply and demand schedules cross. Such an equilibrium is efficient and eliminates the marginal market distortions associated with retail rolled-in pricing. Reaching such a position with Q_3 units of sales, after an initial equilibrium at Q_2 , involves a difficult contraction of the market. The initial excess capacity due to wells already in place creates a temporary need for supply rationing which may cause

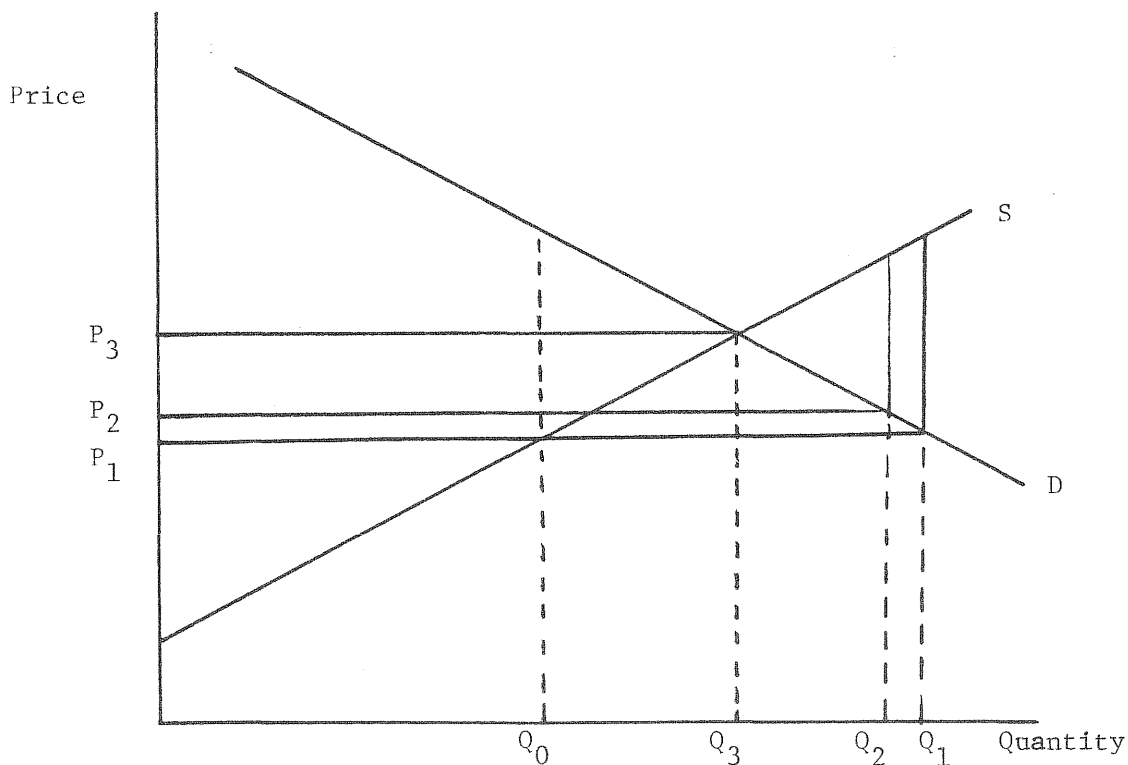


Fig. 3. A retail block-billing pricing equilibrium

unregulated block 2 prices to fall below P_3 to encourage gas usage during the transition period.

In conclusion, this analysis suggests that the policy of partial decontrol, by itself, tends to induce a contraction in the gas market. This explains part of the current pressure on high-priced producers in particular to reduce prices of what is called unmarketable gas. Wholesale block billing, by itself, speeds the adjustment process of finding an equilibrium single price for block 2 supplies, but it does not affect the nature of the ultimate equilibrium. Block billing at both the wholesale and retail levels is needed before the long-run economic distortions associated with rolled-in pricing can be eliminated. Beginning from an initial position that is based on rolled-in pricing, both the partial decontrol and retail block billing policies are accompanied by severe adjustment problems as the industry contracts to a smaller volume of equilibrium sales.

The Effect of Block Billing on Producers

The FERC received many comments stating that block billing would inflict billions of dollars of losses on the industry. Not surprisingly, the segment of the industry expected to absorb such losses differed, depending on the affiliation of the person submitting the comments. The Interstate Natural Gas Association of America, some interstate pipelines, and Stephen Williams writing for the American Enterprise Institute reasoned that pipelines would have large take-or-pay exposure.¹⁵ Spokesmen for producers claimed that billions of dollars of gas would be unmarketable under block billing.¹⁶ The

¹⁵See Cheatham, "Comments and Requests for Clarification of the Interstate Natural Gas Association of America"; see also Stephen F. Williams, The Natural Gas Revolution of 1985 (Washington, D.C.: American Enterprise Institute, 1985).

¹⁶As examples, see the following comments: Don Nickles, "Statement of Senator Don Nickles of Oklahoma"; John Breaux, "Testimony

spokesmen for producers frequently argued that the loss of producer revenue would adversely affect drilling activity.¹⁷ The conclusion frequently reached was that block billing would create a short-term price reduction benefit for consumers, which would be more than offset by the prospect of future shortages due to a reduction in current drilling.

This allegation of large amounts of unmarketable gas or large take-or-pay exposure can be discussed on two levels. As a general proposition, the idea that wholesale block billing, by itself, will have such effects can be viewed in terms of the three regulated price equilibria described in the previous section. In the current state of disequilibrium, it is undoubtedly true that the combination of the FERC block billing and transportation programs would facilitate a more rapid adjustment to a new balance. In that process, some producers and even some consumers are likely to suffer hardship. It is only the adjustment speed, however, that wholesale block billing, by itself, is likely to affect. The unmarketability of the most expensive gas

by Rep. John Breaux to the Federal Energy Regulatory Commission," December 11, 1985; and Tom Loeffler, "Statement of Honorable Tom Loeffler (R-Texas)," December 11, 1985. Nickles is a U.S. Senator from Oklahoma; Breaux and Loeffler are U.S. Representatives from Louisiana and Texas, respectively. See also Stanley Pickens, "Statement of Stanley Pickens"; Mobil Oil Corporation, "Testimony of Mobil Oil Corporation"; Commissioner James E. (Jim) Nugent, Untitled Testimony, December 11, 1985 (Nugent is a member of the Railroad Commission of Texas); T.E. Davis, "Comments of Mr. T. E. Davis on Behalf of E.I. duPont de Nemours and Company," December 12, 1985; Scott Anderson, "Comments of the Texas Independent Producers and Royalty Owners Association," December 11, 1985; and Charles H. Shoneman, "Statement of Charles H. Shoneman on Behalf of the Oklahoma Independent Petroleum Association and Samson Resources Company," December 11, 1985. All of those comments were filed with the Federal Energy Regulatory Commission in Docket No. RM 85-1-000, Part D.

¹⁷The issue was consistently discussed in these comments as a pure income effect, in that loss of revenue leads to reduction of retained earnings that could be used to finance future drilling. Discussion of price incentives to drill were largely confined to observations that some high-cost gas would not be marketable under block billing.

supplies is an inherent feature of the NGPA because it allows some producers to receive economic rents when ceiling prices are lifted. In this sense, one producer benefits at the expense of another, at least in part. The hardship cannot be attributed solely to block billing.

At a more specific level, the arithmetic on which the billions of dollars of projected potential losses rests has the following character. The commenter compares the current price of each pipeline's supply of block 2 gas with an estimate of the market clearing price under block billing.¹⁸ The market-clearing benchmark price is difficult, at best, to estimate. Some observers have used current spot market prices. This creates the appearance of very large potential losses indeed. The average price of block 2 gas for major interstate pipelines is about \$3.50 per mmbtu.¹⁹ The spot market price is \$2.00 to \$2.50 per mmbtu, which creates the appearance of a potential loss of about \$1.00 to \$1.50 per mmbtu. When multiplied by the volume of block 2 gas, about 5 quadrillion btu, the conclusion of such observers is that the pipelines or producers are exposed to \$5 to \$7 billion of potential losses.

Such a loss magnitude depends upon the success of a very small spot market in competing down the price of a much larger block 2 supply. These observers implicitly assume that the price of the block 2 gas is the one which will be forced to adjust by the new market conditions. Since the spot market has no long-term impediments, either regulatory or contractual, that prevent its price from adjusting, it seems much more likely that spot prices will be moved up, at least part way, to meet the declining block 2 price. The current low level of

¹⁸See the comments filed by the Interstate Natural Gas Association of America; Williams, The Natural Gas Revolution of 1985, pp. 28-29; and the Foster Associates Analysis cited in footnote 46 of the FERC Notice Requesting Supplemental Comments, Docket No. RM 85-1-000 (Part D), October 18, 1985. The Notice can be found in the Federal Register at 50 Fed. Reg. 42372.

¹⁹See the appendix of the Comments of the Natural Gas Supply Association in Docket No. RM 85-1-000, filed July 15, 1985.

spot prices is, in part, a reflection of the lack of price flexibility of large gas volumes that are committed to the interstate pipelines. This current, distorted constellation of market prices must be used very carefully in inferring producer-pipeline revenue losses that can be sensibly attributed to wholesale block billing.

The reader should be aware that the above projected losses, if they occur, are due to a market adjustment process that does not necessarily depend on block billing. The difference between block 2 and spot prices is a symptom of market disequilibrium. The FERC transportation program, if adopted by most pipelines, will allow more vigorous competition between pipeline and spot sources by giving distributors an opportunity to choose. While it is true that distributors would perceive the pipeline's rolled-in price to be marginal in the absence of block billing, the spot market nonetheless will place downward pressure on block 2 prices. If the action of distributors exercising their purchasing options were the only form of competition, the eventual equilibrium would equate the spot market price with some sort of average of the pipelines' rolled-in prices. Pipelines themselves, however, can include spot market purchases in their own system supply, a form of competition which should tend to equate block 2 prices with the spot market. It is this kind of pervasive competition which is needed to establish a single block 2 price in the partial-decontrol equilibrium described in the previous section. The more vigorous this competition, the more quickly such a uniform block 2 price will occur. In the absence of such competition, it probably is true that the natural gas market could remain out of equilibrium for several more years with spot market prices below those of block 2. Once the equilibrium is reached, however, the losses currently being attributed to block billing will have occurred regardless of whether the block-billing policy is adopted or not. The primary effect of adopting the FERC billing proposal is likely to be a speeding up the process of reaching, not changing the nature of, the partial-decontrol equilibrium.

Social Fairness and Equity Issues

Because the FERC block-billing proposal changes the status quo, there are a variety of serious, social equity concerns that must be addressed. Three of these seem particularly important.

A number of public officials from North Dakota explained in their comments that block billing most likely would be a very serious blow to the Great Plains Synthetic Natural Gas Project if the gas from the project were placed in block 2.²⁰ FERC Opinion 119, in April 1981, was part of the settlement of litigation in which it was agreed that the pipelines would roll-in the costs of synthetic gas. On the one hand, a policy of rolling-in the high price of synthetic gas is clearly inefficient, in the short run. On the other hand, the investment in the project was based on the expectation of continued rolled-in pricing treatment, and therefore a decision to place synthetic gas costs in block 2 clearly would be inequitable. In this particular conflict between efficiency and equity, it appears from its Notice Requesting Supplemental Comments that the FERC is inclined to place such gas in the block 1 category.

In the comments made by the Northern Distributors Group, it is clear that the proposal to base block 1 entitlements on 1978 to 1984 usage would cause large changes in prices within this Group's service area if block billing is adopted. The difficulty stems from rather large shifts in gas purchasing patterns that occurred because some fortunate large customers had opportunities to contract for low-priced

²⁰See the following comments: Byron L. Dorgan, "Testimony before the Federal Energy Regulatory Commission," December 11, 1985; and Quentin Burdick, "Statement by Senator Quentin Burdick before the Federal Energy Regulatory Commission," December 11, 1985. Dorgan is a U.S. Representative and Burdick is a U.S. Senator. See also George A. Sinner, "Statement to the Federal Energy Regulatory Commission," December 11, 1985; and Sarah Vogel, "Testimony of Sarah Vogel", December 11, 1985. Sinner is the governor of North Dakota and Vogel is an assistant state attorney general. All of these comments were filed with the Federal Energy Regulatory Commission in Docket No. RM 85-1-000, Part D.

supplies in 1983-84. Because these customers were on the pipeline system from 1978 to the early 1980s, they still have a substantial claim to block 1 supplies under the FERC formula. Such customers could assert a right to substantial quantities of block 1 gas and still have favorably priced nonsystem supplies in lieu of the pipeline's block 2 gas. This will create a severe burden on those customers who have no supply choices and find themselves with a relatively small allocation of block 1 gas compared to their current usage. This is a very serious problem, but it is one that has a very simple solution. The FERC could allow each pipeline wide discretion in fashioning a set of allocation fractions for each of its customers. From the perspective of the FERC, the essential reason why block billing works is that each customer's block 1 entitlement is fixed. It is that fixity which causes the block 2 price to be perceived as marginal. Any fixed fraction accomplishes this. The FERC could suggest the historical 1978-84 period as a basis for the entitlements, but could allow each individual pipeline to submit any other suggested allocation, along with evidence that its customers have agreed to the plan. There is always a set of numbers that would keep all customer prices the same immediately before and after the implementation of block billing. The fact that a uniform national standard for this allocation causes some regional hardship is not unexpected, but could be accommodated with a voluntary, pipeline-by-pipeline plan.

Several commenters pointed out ways that block billing would be discriminatory. The Secretary of Energy and Minerals of New Mexico said that the proposal would create a class of preferred customers and is illegal, therefore, under the Natural Gas Act.²¹ Since all customers receiving gas in interstate commerce would be entitled to some fraction of low-priced gas (direct industrial customers of pipelines would receive an entitlement in the revised version of part D), it would seem no distinct class of customers is singled out. DuPont, the American Paper Institute and others point out that some

²¹Biderman, "Supplemental Comments of Paul L. Biderman."

manufacturers with large entitlements would have an advantage over rivals.²² Indeed, a new enterprise would have only block 2 gas and would be at a more severe disadvantage, in this view. The importance of this effect depends upon one's view of the environment in which the industrial gas end user competes. Firms in fully competitive markets would base output decisions on the marginal cost of gas and consequently, no discrimination would occur at the margin. Indeed, it could be argued persuasively that the current differences in rolled-in pricing among pipelines is discriminatory because these create perceived differences in marginal prices based on a pipeline's fortuitous supply of block 1 gas. Block billing in this alternative view successfully eliminates discriminatory differences in average prices and creates a level playing field at the margin for industrial end users.

Raise Old Gas Prices?

Several commenters suggested that the FERC should consider raising old gas prices, in lieu of implementing its block-billing proposal.²³ The Department of Energy has issued a Notice of Proposed Rulemaking under Section 403 of the DOE Organization Act requesting that the FERC eliminate vintage pricing of old gas and replace the current constellation of ceiling prices with a single ceiling price.²⁴ The

²²See Davis, "Comments on Behalf of the E.I. duPont de Nemours and Company;" Murphy, "Statement on Behalf of the American Paper Institute, Inc.;" and Donald P. Mitchell, "Statement of Donald P. Mitchell on Behalf of the Louisiana Land and Exploration Company," presented to the Federal Energy Regulatory Commission, Docket No. RM 85-1-000, Part D.

²³A partial list includes the U.S. Department of Justice, the Illinois Commerce Commission, Governor White of Texas, the American Iron and Steel Institute, duPont, as well as producers such as Amoco Production Co., and Mobil Oil Corporation. Their comments were filed with the FERC in Docket No. RM 85-1-000, Part D.

²⁴DOE NOPR, 50 Fed. Reg. 48540 (November 25, 1985).

FERC accepted comments on this proposal in Docket RM 86-3 until February 25, 1986.

Many of the commenters on block billing preferred that the FERC raise block 1 prices and not implement block billing. The Illinois Commerce Commission stated that there is no logical reason why the Commission could not do both. It is true that raising the just and reasonable price of block 1 supplies would reduce the distortions associated with retail rolled-in pricing. In terms of figure 2, the vertical distance, representing the marginal value of the distortion, clearly becomes smaller as the ceiling prices in block 1 increase. In addition, the DOE has estimated that raising old gas prices would result in about 34 trillion cubic feet of additional old gas reserves being produced through recovery methods that are not economically viable at current prices. These gains in economic efficiency, however, are at the expense of the equity concerns that prompted the Congress to require in the NGPA that such gas be regulated forever in order that consumers would receive the economic rents.

Raising old gas prices would not improve the process of market adjustment from one equilibrium to another equilibrium, as economic conditions shift in the future. Block billing facilitates this dynamic adjustment process. Block billing, if eventually adopted at the retail level by state commissions, would be capable of achieving a balance which is close to the undistorted equilibrium in figure 3. Such a fully-competitive equilibrium could be reached also if old gas price ceilings were raised high enough not to be constraining. The difference between these two policies, which more or less achieve the same objective, lies in the identity of those who receive the economic rents. Block billing preserves some of these rents for consumers, while raising old gas prices bestows them upon some subset of producers.

It should be noted that raising old gas prices ultimately would be as disruptive to high-cost gas producers as would retail block billing.

That is, a properly sequenced equilibrium with a market-clearing price for old gas would force many high-cost producers out of the market. Many of these are likely to be independent producers that commented against the block-billing proposal. Major producers are likely to sell gas in both block 1 and block 2, so that the loss of some high-cost, unmarketable production would be offset, within the same company, by profits from raising the price ceilings on low-cost gas. Small producers, particularly those who filed comments against block billing, are likely to be seriously hurt by the proposal to raise old gas prices. Support for the DOE proposal among producers, then, may not be uniform.

The FERC may wish to consider block billing in conjunction with some increase in old gas prices. This would provide the incentive to recover some part of the old gas enhancement identified by the DOE, while at the same time, improving the dynamic price adjustment ability of the market.

APPENDIX

PERCEIVED PRICES UNDER BLOCK BILLING

This appendix provides the technical details that support the analyses of the distributor's perceived price of gas purchases from an interstate pipeline under the FERC block billing proposal.

Let the pipeline's total annual sales be T , which is divided into block 1 and block 2, T_1 and T_2 respectively. Pipeline customer i receives D_i units of gas, divided into D_{1i} and D_{2i} for blocks 1 and 2. Under block billing, each customer is allocated a fixed fraction, α_i , of the T_1 supply. If correct, short-term, sequencing were used, T_1 would be invariant to T , as long as total pipeline sales exceed the block 1 supply. If some type of prorationing policy is followed, T_1 will be sensitive, perhaps proportional, to T . Let $T_1 = f(T)$ denote this response of block 1 supplies to total sales because of incorrect sequencing. Note that $T = T_1 + T_2 = \sum D_i = \sum D_{1i} + \sum D_{2i}$.

With these definitions, the customer's purchase of block 1 can be written as

$$D_{1i} = \alpha_i T_1 = \alpha_i f(T) \quad . \quad (1)$$

The customer's bill for pipeline gas is

$$\begin{aligned} B_i &= P_1 D_{1i} + P_2 D_{2i} \quad , \\ &= P_1 \alpha_i f(T) + P_2 (D_i - \alpha_i f(T)), \quad (2) \end{aligned}$$

where P_1 and P_2 are the prices of block 1 and block 2 gas. The distributor's marginal price of additional purchases is

$$\frac{\partial B_i}{\partial D_i} = \alpha_i f' P_1 + (1 - \alpha_i f') P_2 \quad , \quad (3)$$

which is a weighted average of P_1 and P_2 , with the weight given to P_1 being the customer's fractional allocation of block 1 multiplied by the sensitivity of the pipeline's block 1 purchasing practices to its total sales. (Note that $\partial T/\partial D_i = 1$).

With correct sequencing, $f'=0$ and the marginal price is P_2 , which is the economically efficient price signal. Even if f' is not zero, however, the perceived price in equation (3) will be close to P_2 as long as the customer's purchases are small in relation to the pipeline's sales, that is, α_i is a small fraction. For example, if half of a pipeline's supply is from block 1 sources, and the pipeline is forced by state prorationing laws or other contractual obligations to take gas proportionally, then $f' = 1/2$. If α_i is 10 percent, then the distributor's marginal price would place 5 percent ($1/2 \times 10$) of the weight on the block 1 price and 95 percent on the block 2 price. If, as seems likely, the pipeline is able to emphasize, perhaps imperfectly, its sequencing towards a policy of buying block 1 gas first, f' could be much smaller than the average fraction of block 1 gas in the system supply.

Note that when the i -th distributor changes its purchases, there are externalities imposed on others. The bill of the j -th distributor, for example, responds as follows:

$$\begin{aligned} \frac{\partial B_j}{\partial D_i} &= P_1 \alpha_j f' - P_2 \alpha_j f' , \\ &= (P_1 - P_2) \alpha_j f' . \end{aligned}$$

Using the previous example. if the price difference between block 1 and 2 supplies were 3 dollars (a negative \$3.00), the externality becomes

$$\begin{aligned} \frac{\partial B_j}{\partial D_i} &= -3(.90)(1/2) \\ &= -1.35, \end{aligned}$$

meaning that the bills of the remaining 90 percent of the pipeline's customers go up by an aggregate \$1.35 for each unit decrease in the i-th distributor's purchases. Hence, a distributor that purchases 10 percent of its pipeline's sales would perceive a marginal price based on a 95 percent weight being given to the block 2 price, but in so doing would impose a negative externality on other pipeline customers. The externality goes to zero as the pipeline becomes more successful in correctly sequencing its takes.

The analysis of the block 2A/2B proposal in the second section of this report (supra, p. 16) contains a table showing a distributor's perceived marginal price in four circumstances. These can be computed based on the example in section 1 in which a hypothetical distributor has 100 units of block 1 gas at \$1.00 per unit, 50 units of block 2A gas at \$3.00 per unit, and 50 units of block 2B gas at \$5.00 per unit. Total gas cost is \$500.00. Supposing the distributor reduces his purchases by 20 units, the analysis of the marginal price depends upon whether the distributor has an entitlement to block 2A, and also upon whether the pipeline can correctly sequence its purchases. Table 2 shows the details of this example.

TABLE 2
PERCEIVED MARGINAL PRICE IN FOUR CIRCUMSTANCES

Distributor Has An Entitlement to Block 2A Sequencing Policy	YES	YES	NO	NO
	Correct	Proportional	Correct	Proportional
Purchases from: Block 1	100	99	100.0	99
Block 2A	50	49.5	40.8	40.5
Block 2B	30	31.5	39.2	40.5
Total Cost	400	405	418.4	423
Cost Saving	100	95	81.6	77
Perceived Price	\$5.00	4.75	4.08	3.85

The calculations in table 2 are based upon the actions of the pipeline when faced with a 20 unit reduction by the distributor. Initially, the pipeline has 1000 units of block 1 gas, and 500 units of gas from blocks 2A and 2B. In the first column of table 2, with correct sequencing the pipeline's purchases are 1000, 500, and 480 from blocks 1, 2A, and 2B respectively. The distributor has a 10 percent entitlement to the blocks 1 and 2A supplies and so all 20 units of reduction are in the pipeline's block 2B supply.

In the second column, the pipeline purchases proportionally and therefore takes 990, 495, and 495 units of gas from blocks 1, 2A, and 2B respectively. The distributor has a 10 percent entitlement to blocks 1 and 2A, which implies that his purchase of 180 units is distributed as 99, 49.5, and 31.5 units across the three blocks.

In the third column, the pipeline uses correct sequencing and its purchasing pattern is 1000, 500, and 480, as explained for the circumstances of column 1. In column 3, however, the distributor has a 10 percent claim only on block 1 gas. Out of the 180 units purchased by the distributor, then, 100 are from block 1 and the remaining are proportional to the pipeline's pattern. This means the distributor, in effect, purchases 100, 40.8, and 39.2 units from the three blocks respectively.

In the final column of table 2, the pipeline's proportional purchasing results in a pattern of 990, 495, and 495 units from the three blocks. The distributor can claim 10 percent of block 1 supplies only. This gives the distributor 99 units of block 1 gas and the remaining 81 units are divided equally between blocks 2A and 2B.