

Bill and Keep as the Efficient Interconnection Regime?

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Abstract

In this paper I review the recent paper by DeGraba (2000) that proposes a version of Bill and Keep (called COBAK) as the efficient interconnection regime. I argue while the proposed interconnection regime is suitable for some types of interconnection it would be quite undesirable for others. I show that whether the COBAK approach is suitable for a particular type of interconnection depends on, among other things, the importance of network externalities and on the willingness of called parties versus calling parties to pay for calls.

1 Introduction

In a thought provoking new paper, DeGraba (2000) puts forward a unified approach to interconnection pricing.¹ This approach is called the ‘Central Office Bill and Keep’ (COBAK). According to the paper the approach can be applied to all types of carriers that interconnect with, and to all types of traffic that pass over, the local circuit-switched network. With some modifications, the approach can also be applied to calls involving interexchange carriers.

The approach consists of two rules that are jointly applied when two interconnecting parties cannot agree on terms. First, a called party’s carrier cannot charge an interconnecting carrier to terminate a call. Second, the calling party’s network is responsible for the cost of transporting a call between the calling party’s central office and the called party’s central office.

To understand the motivation for and the benefits of this COBAK proposal I first review the main problems with existing regulatory regimes put forward in the paper, and note how the COBAK proposal can help solve these problems. However, I show that, even if there is already facilities based competition and retail price flexibility, the COBAK proposal does not solve the fundamental problem of pricing out network externalities. In fact, by ruling out the use of termination charges to internalize such externalities, it often leads to less efficient outcomes. It also fails to identify the basic role of interconnection charges in allocating joint costs according to Ramsey principles.

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¹ Interconnection pricing refers to the price set for access to and between telecommunication providers. Comprehensive surveys of the economics of access pricing and interconnection pricing are provided by Armstrong (2000) and Laffont and Tirole (2000).

I argue that while the COBAK proposal might be a step in the right direction for some types of interconnection (for example, ISP termination) it could be quite undesirable for others (for instance, fixed line and mobile interconnection). Whether the COBAK approach is suitable for a particular type of interconnection depends on, among other things, the importance of network externalities and on the willingness of called parties versus calling parties to pay for calls. Contrary to the claims of DeGraba's paper, it is not an efficient interconnection regime per-se.

2 Problems with existing interconnection arrangements

To understand the benefits of the COBAK approach one needs to first review the problems with existing regulatory regimes. The problems identified in the paper can be summarised as:

- Arbitrage problem – inconsistent regulations result in termination charges and retail prices that give rise to arbitrage problems. The most obvious manifestation of this problem arises in the termination of ISP-bound calls. If the reciprocity principle is applied to charges for local call termination, while local call prices are capped, the revenue from terminating ISP-bound calls will typically be well above cost, while demand for placing ISP-bound calls will not be directly affected by an increase in termination charges. Since ISP-bound calls tend to be very long-held, this leaves entrant networks and ISPs able to collect lucrative termination revenue from the incumbent local networks without the incumbent network having any chance of recovering these costs. Wright (2001) discusses in more detail the problem of ISP reciprocal compensation and arbitrage, while Haring and Rohlfs (1997) discuss further arbitrage problems arising from existing interconnection regulations.²
- Bottleneck problem – when a call is placed to a particular person, the originating carrier typically has no choice but to purchase the termination service of the carrier to which the called party belongs. Thus, local networks that terminate calls to their customers have a type of market power. This bottleneck problem remains even with competition between terminating carriers, since the bottleneck relates to controlling access to particular customers, and connecting with different customers is usually not an option for the calling party. It implies each terminating network has an incentive to inflate their termination charge above their rivals', although having done so they will likely bid away most of any associated rents as they compete to attract the customers to their particular network for which they earn termination revenue. Wright (2000) models the competition between rival facilities-based carriers that terminate calls, and derives similar results. These results imply the termination bottleneck is not a source of market rents for terminating carriers.

² Another manifestation of the arbitrage problem is the ability of carriers to use interconnection prices for anti-competitive purposes, such as causing a price-squeeze by having a high access price and a low retail price.

Rather, the bottleneck problem manifests itself as a coordination failure. If carriers can coordinate in the setting of their termination charges, competing networks will not have the incentive to set high charges, especially where the interconnection is two-way in nature.

- Inefficient pricing – because interconnection charges tend to be set as uniform per-minute charges by regulators, they tend to lead to inefficiencies in final prices to the extent they do not reflect the underlying non-linearities and variations in costs. Thus, according to this argument, linear interconnection pricing may prevent flat rate charging or other forms of non-linear pricing which would otherwise be offered and could be more efficient.
- Calling party pays everything – the paper argues that the called party as well as the calling party shares in the benefits of calls, and so one should expect in an efficient outcome both called and calling parties share in the cost of the call.

3 Benefits of the COBAK approach

According to DeGraba, all of the above problems can be solved, or at least largely alleviated, by adopting the COBAK approach. The rationale for this is quite straightforward. In fact, in the paper it is explained without using a formal model.

Rather than assuming that retail prices are constrained to the caller pays principle, DeGraba relaxes this standard assumption and assumes that if networks cannot recover their costs through termination charges they will be forced to recover them from customers directly. Thus, under a bill and keep approach, those networks that terminate calls will be forced to cover the cost of terminating calls by charging the called party directly. Under such pricing there would be no arbitrage problem, pricing for calling and called parties would be competitive (assuming sufficient facilities-based competition), and pricing would consequently not be artificially affected by regulated termination charges. Such an approach also ensures that called parties pay directly for a share of the benefits they receive from calls. Other benefits of the approach include the greatly reduced role for regulatory intervention and the lower transaction costs arising from a bill and keep approach. Thus, for instance, there is no need for regulators to estimate regulated prices for termination services. The main role left for regulators is likely to be in settling disputes over the locating of the central office to which transport of the call must be provided by the calling party's carrier.

4 Problems with the COBAK approach

Two fundamental problems with the COBAK approach that are not addressed by DeGraba are its failure to internalize network externalities between calling and called parties³ and its

³ Similar issues arise in payment systems where Frankel (1998) has argued for zero interchange fees to be used. Chang and Evans (2000) survey the debate surrounding the collective setting of an interchange fee by member banks in card payment systems. The primary justification put forward for allowing competing banks to agree on an interchange fee, which is paid from a merchant's bank to a cardholder's bank for each

failure to apply Ramsey principles to the recovery of joint costs. These two features are precisely the reason why interconnection charges are justified in the first place.⁴ Otherwise, as DeGraba claims, networks can simply price end users directly (both for originating and receiving calls) and competition between networks will lead to efficient outcomes.⁵

Consider first the case of network externalities between calling and called parties. A call between two parties can be thought of as a service that is jointly consumed. Because of this the calling party receives a direct benefit as a result of the called party being willing to take the call. This is a positive externality enjoyed by the calling party arising from the called parties decision to accept calls. Assuming, as is likely the case, this externality is larger compared to the externality going in the other direction, then there may be efficiency grounds to have the calling party subsidize the called party for each call.⁶ This subsidy can be enacted through a termination charge. A termination charge received by the terminating network will, through competition, be passed back to the called party by way of cheaper retail prices for services provided. If the calling party funds this termination charge, then this could be an efficient transfer between the two types of callers.

By imposing bill and keep, or giving networks the option of doing so when it is in their individual interests to adopt the principle, such transfers will be eliminated. This will lead to serious inefficiencies where there are significant network externalities.

An example where such network externalities are likely to be very important is the case of interconnection between fixed-line and mobile networks. In this case there will be externalities arising from households' subscription as well as usage decisions. Since fixed-line networks have more or less reached saturation, whereas mobile networks have penetrations rates that are closer to 50%, a small decrease in the price offered to mobile customers can increase their participation and thereby provide a positive externality for existing fixed-line customers (and networks). If the price of fixed-to-mobile calls is inflated and the higher price is used to subsidize low mobile subscription charges, the result can be an increase in welfare. Without providing this subsidy there would be less mobile customers. But with fewer mobile customers, callers would have fewer options to call people who are away from their land-line. Even though a caller may be prepared to pay a high price to reach such people, the call will not be possible.

The second fundamental problem with the COBAK proposal is its failure to take into account Ramsey type principles. A call between two parties can be thought of as a service that is jointly provided. Thus, ignoring the joint nature of demand (and resulting network externalities), the Ramsey principle can be used to determine how the common cost of the call can be allocated between the two benefiting parties. The basic idea of this principle is that to get efficient cost allocation, costs should be allocated in accordance with

transaction made, is that it allows banks to internalize network externalities that exist between cardholders and merchants.

⁴ An additional problem with direct cost recovery from consumers is that this may entail more points of billing to consumers, thereby increasing transactions costs and customer disutility. Where these costs are high, it suggests the joint costs of providing calls may be best covered directly by only one of the parties, with the other network provider being compensated through an interconnection payment.

⁵ This of course assumes there is sufficient competition in the first place.

⁶ Since any call is a joint service to both calling and called parties, in the absence of any charges to either party (or any side payments), the statement that there is a net externality enjoyed by the called party is equivalent to the calling party having a higher willingness to pay for calls than the called party.

willingness to pay.⁷ A key failing of the COBAK proposal is that it does not recognize that the called party may often have a much lower willingness to pay than the calling party. In fact, the assumption that the called party has no willingness to pay may be closer to reality in many situations, than DeGraba's implicit assumption that the willingness to pay of calling and called parties is always equal. If this is the case, then Ramsey principles dictate that termination charges will be needed such that calling parties bear the bulk of the costs of the networks.

I now illustrate these principles with two important examples of interconnection – fixed-to-mobile termination and the termination of ISP-bound calls.

5 Two contrasting examples of interconnection

A good illustration of these principles is the case of how fixed-to-mobile termination differs across different jurisdictions. In the United States, local fixed-line callers have traditionally only been required to pay the normal price of a local call to place a call to someone on a mobile phone. Instead, mobile carriers have been forced to obtain all revenues from mobile customers directly (they have not been allowed to charge fixed-line networks, since fixed-line callers have had no way of distinguishing fixed-line and mobile numbers). As a result many mobile customers leave their phones switched off since they do not want to pay to receive calls that they do not originate (that is, they have low willingness to pay). Moreover, many more customers do not get mobile phones in the first place. When mobile customers allow themselves to be called, they provide a positive externality to fixed-line callers. To the extent these externalities are not internalized, this approach to interconnection is likely to be inefficient.⁸

This U.S. approach to fixed-to-mobile termination is in sharp contrast to the approach taken in European countries where fixed-to-mobile termination charges are often quite high, and consequently mobile subscription is discounted and fixed-to-mobile calls are more expensive. Not surprisingly, the result has been a slower rate of mobile take-up in the United States than comparable European countries, especially when other factors are taken into account. Although no formal welfare comparison of the two approaches has yet been attempted, a plausible hypothesis is that 'receiver-pays' in the United States has delivered lower overall surplus than the 'caller-pays' approach in Europe.

An example where there are no network externalities between calling and called parties is the case of ISP-bound calls. For such calls, COBAK is likely to be an improvement on current practice. To see why, consider a call bound for an ISP and suppose that the ISP or terminating network cannot charge the originating network for such a call. Because the ISP will recover the cost of the call from the customer who wants an ISP connection, and because this is the same person who is making the dial-in call from the originating

⁷ This assumes willingness to pay is inversely related to the elasticity of demand so that consumers which have a high willingness to pay also have a low elasticity of demand. Ramsey (1927) developed a method for establishing efficient taxing schemes where one needs to raise a certain amount of (tax) revenue with minimal efficiency distortions.

⁸ These problems are magnified by the fact terminating mobile calls may be considerably more expensive than originating fixed-line calls. Thus, with a bill-and-keep interconnection arrangement, the mobile subscriber will generally face more of the costs of the joint service of a fixed-to-mobile call, even though as a call receiver they will most likely value the call less.

network, there can be no network externality between the calling and called parties. Moreover, there is no need to use a Ramsey analysis to allocate the cost between the calling party and the called party. Provided the ISP market is competitive and costs to ISPs flow through to final customers, a customer requiring ISP access is the same customer that will face any higher costs from higher ISP charging. Thus, there are no sound grounds to allow networks to set termination charges for ISP-bound calls.⁹ To the extent such termination charges cause other problems (such as arbitrage), they can be ruled out without compromising efficiency.

6 Conclusions

One of the most fundamental questions in the design of pricing for interconnected networks is whether the networks should be allowed to charge for interconnection. As these arguments show, DeGraba's proposed COBAK approach to interconnection, which is based on the Bill and Keep principle, while helping to solve some problems of interconnection pricing, will in many cases move us further away from the efficient solution. The key reason is that his approach relies on direct recovery of cost from consumers, which ignores the basic principles of network externalities and Ramsey's principle of efficient cost recovery that should be taken into account when designing an interconnection and pricing regime for a network.

A telephone call provides a joint service, both to the calling and called party. However, this joint service is provided by independent networks, each of which incurs costs to provide a component of the joint service. Absent any side-payments between networks, there is no reason to expect that at the efficient retail prices, each network will necessarily want to provide the component of the service required. For instance, efficiency may entail that the receiver of the call should pay very little towards the costs of the call, thereby causing the network servicing the called party to suffer a loss from terminating such a call. Alternatively, as is the case for fixed-to-mobile calls, the cost of terminating the call on the mobile network may be considerably higher than the cost of originating the call on the fixed-line network. If fixed-line and mobile firms recover all their costs directly from their customers, the mobile subscriber will generally face more of the costs of the joint service of a fixed-to-mobile call, even though as a call receiver they will most likely value the call less. Such an outcome is likely to be inefficient. The role of access or interconnection prices is then to provide appropriate side-payments so that efficient pricing can be delivered by independent (and sometimes competing) networks.

DeGraba proposes COBAK as an across the board solution to the problem of interconnection. As shown here this is not appropriate. In practice, the approach is likely to be an improvement on the current approach to termination of ISP-bound calls. Beyond this case, analysis is required as to whether the benefits such an approach brings outweigh the losses identified above. Jeon *et al.* (2001) have recently developed a model in which consumers get utility from (and can be charged for) receiving as well as originating calls.

⁹ This assumes that the retail price of ISP-bound calls is not regulated. If, as is usually the case, the retail price of ISP-bound calls is capped, then the efficient termination charge for ISP-bound calls will in general depend on the regulated retail price of ISP-bound calls. See Wright (2001) for a characterization of the efficient termination charge in this case.

Their model could be used to address some of the issues raised in this review. Specifically, future work should attempt to use a model such as theirs to more formally evaluate the welfare consequences of adopting bill and keep and forcing telecommunication operators to recover their costs directly from their own consumers.

7 References

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