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Competition for Partners: Strategic Games in Wholesale International Roaming

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Javier Domínguez Lacasa

COMPETING FOR PARTNERS: STRATEGIC GAMES IN WHOLESALE INTERNATIONAL ROAMING

Abstract

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Recent contributions find reasons for regulation at the wholesale level based on the existence of random traffic and on the bilateral nature of the wholesale deals, which raise the equilibrium prices even when operators can choose a preferred network. This paper intends to investigate whether or not those concerns are justified. This is done by modelling the bilateral roaming negotiations and extending the current models, assuming that home operators (the ones with a retail contract with the customer in its country of residence) can decide not only their preferred network in each visited country, but also the distribution of their outbound traffic among the visited operators. There are technological solutions that allow this steering, and the results change dramatically.

When traffic steering is perfect no operator has market power, and lower prices are passed on to end users through competition for retail customers. Contrary to previous findings, the bilateral nature of international roaming wholesale deals is actually an additional source of competition, because the roaming out traffic (the traffic of an operator's retail customers abroad) and the roaming in traffic (the traffic of foreign customers that an operator is able to attract) are directly linked, and this creates an incentive for operators to lower the prices of retail roaming compared with a scenario of anonymous wholesale trading**.**

JEL codes

Keywords
International Roaming; Mobile telephony; Market Structure and Pricing; Regulation

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COMPETING FOR PARTNERS: STRATEGIC GAMES IN WHOLESALE INTERNATIONAL ROAMING

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Acknowledgments: This paper draws heavily from discussions and meetings with the Telefónica wholesale roaming team. I'd like to mention especially the lessons learned from Tandria Enrique, Gary Hope, José Antonio López-Jamar and Ángel Merodio. Comments from Germán González and Fernando Herrera from the Telefónica Spain regulatory team were also very useful. Any misinterpretations or mistakes in the modelling are not their fault.

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1. Introduction

International roaming gives mobile customers the possibility to use their mobile handset and their mobile phone number when they travel to a foreign country, in which their home network operator has no coverage. Operators in the country of residence of the customer ("home operators") conclude agreements with operators in the foreign country ("visited operators"). Through these agreements, visited operators let foreign users connect to their networks, and charge a wholesale fee to the home operators, who in turn charge end users a retail price for the service. In general, international roaming agreements are bilateral, in the sense that each party is both a seller (it acts as a visited operator and receives "inbound" traffic from the other party) and a buyer (it acts as a home operator and sends "outbound" traffic to the foreign operator).

Whether international wholesale roaming should be regulated is not a straightforward question: there are several suppliers per country and traffic steering techniques, which get more efficient by the day, allow home operators to direct traffic to preferred networks in the visited country. It is not obvious that there is a bottleneck that calls for regulators to intervene. Nevertheless, International roaming is regulated in the European Union since 2007. On the wholesale side, visited operators have to comply with a cap on the average revenue per minute, per SMS and per Megabyte. The cap has to be complied on a yearly basis for each home operator (i.e. visited operators cannot charge some home operators above the cap and others below the cap).

There is a small but growing literature on international roaming. Recent papers have generally argued in favour of the need for regulation, focusing on two possible market failures. One comes from what we can call "random traffic", the portion of traffic that cannot be controlled at all by the home operator and is distributed randomly among the visited operators. Salsas & Koboldt (2004), Lupi & Manenti (2006, 2008) and Foros, Wasenden & Ambjørnsen (2011) assume that there is always a portion of traffic that is random, and as a consequence in their models there is always at least some traffic that is independent from the wholesale price. Visited operators are monopolists with respect to this traffic,

and this creates an incentive to charge supracompetitive prices which are highest when traffic steering techniques are poor and when the number of competitors in the visited country is large (because in that case each individual wholesale price has a smaller effect on the average wholesale price perceived by the home operator).

A second, more subtle, market failure arises from the bilateral nature of the market (a single agreement involves operators acting as both sellers and buyers). Shortall (2010) points out that operators with a large market share in outbound traffic (the communications made by their customers abroad) have an advantage which they can use to charge a premium to the operators who want to partner with them, even when traffic steering is completely reliable and a single preferred network can be selected. It should be noted that his model has restrictive implicit assumptions, in particular that excess capacity exists in all networks, that the price of wholesale roaming cannot go below a certain level and that traffic steering technologies are imperfect and force each home operator to choose just one network in the visited country as a preferred partner. Using a different perspective, Bühler (2009) finds that alliances can be used as a commitment device to soften competition in the retail market. The logic is that an alliance can be used as a way to make credible a long term commitment to exchange traffic at a high price with a particular operator in the visited country, signalling the competitors in the home country that a price war is unlikely. Bilateral agreements facilitate this strategy because the potential loss of retail revenues caused by high retail prices is compensated by the traffic commitments and high prices agreed within the alliance. Interestingly, both Bühler (2009) and Shortall (2010) propose banning bilateral trading as an alternative to the price controls currently in place.

The European Commission has shown sympathy for these views, and in fact it opened to consultation the idea of effectively banning bilateral trading as a "structural solution" to the problem of high roaming tariffs. For practical reasons it seems unlikely that such a solution will be implemented, but nevertheless the argument of lack of competition in the wholesale market remains uncontested

and is commonly used by regulators to justify other measures like cost oriented price controls.[1]

The main purpose of this paper is to investigate whether the results of the previous literature still hold when we relax some of their assumptions. In particular it will be assumed, more realistically, that visiting operators can choose more than one preferred network, and decide the distribution of traffic among the networks in the visited country. As will be shown, this new assumption changes the outcome dramatically, and it no longer holds that the wholesale price is inefficiently high.

The remainder of the paper is organised as follows: sections 2 serves as a prologue, with a brief discussion of the "random traffic" market failure. Sections 3 and 4 contain the core of the analysis, first with a model in which there is no random traffic, but the home operator can only steer its outbound traffic (the communications of its customers abroad) to a single visited network, and then extending the analysis to the case of perfect steering. Section 5 discusses the link between the wholesale and retail international roaming markets. Section 6 concludes.

2. On the relevance of random traffic

The standard line on the history of roaming is that random traffic is a source of trouble, because it gives visited operators monopoly power and leads to high wholesale prices that are ultimately paid by travellers using their phone abroad.

The logic[2] is as follows: each operator in the home country has roaming agreements with all networks in the visited country, but only one of them is selected as the preferred network. This network receives a certain percentage of the traffic, while the rest is "uncontrolled". If all networks had the same coverage, random traffic would be shared evenly. With *n* visited operators, each

[1] BEREC (2011) states that "... wholesale price regulation continues to be appropriate. There is no strong reason to believe that wholesale competition will be more intensive in the future than it has been in the past. On the other hand, costs of provision should reduce rather steeply, for example as a result of anticipated reductions in regulated mobile termination rates"

[2] See Lupi & Manenti (2008)

would receive 1/n of the random traffic. All the networks not selected as preferred networks are actually monopolists on their share of random traffic, and the only constrain for them is the impact of their decision on the retail price and indirectly on end user demand. The conclusion is that the expected wholesale price is above the competitive level. In fact, just like we see in mobile termination models, the higher the number of suppliers the higher the market price, because when the number of suppliers is large, each wholesale supplier taken individually thinks that their price has a low impact on the retail price.

No doubt, there are countless stories about the tricks used by visited operators to be the first to connect a foreign customer and keep it on a particular network. However, the devilish nature of random traffic should not be overestimated, for several reasons.

First of all, as long as there are several networks available in the visited country home operators have strong incentives to invest in traffic direction technologies, and there are several suppliers of solutions that make it affordable even to the smallest operators. Under these circumstances, it is doubtful that there is a market failure that requires regulation. It might just be that traffic routing is simply another cost element that enters into the production function like any other.

Secondly, we must not forget that random traffic can only take place when the home operator decides to permit their customers to connect to several networks. If an operator feels it is being overcharged in its random traffic, and cannot afford traffic steering, there is always the alternative of barring connections to all networks but one. The end users would have access to the same quality that the residents of the visited country get, and the home operator would be able to choose among competing networks. Barring can also be used as a temporary measure to put pressure on visited operators and force them to lower the price, with the effect that after some time the measure is lifted, the perceived wholesale price is reduced and the roamers can continue enjoying the benefits of multi-network coverage.

Finally, random traffic is many times just lack of coverage from the preferred operators. Good coverage is expensive, and the operators who have invested on it are entitled to use it as a competitive tool, and charge a premium for it. Again, it is not clear that regulators should step in and set a price cap, and if they do they should consider that the "problem" exists only in high cost areas.

3. Traffic steering to a single network

Up to 2009 random traffic was considered by regulators and analysts as the only source of inefficiency in the international roaming wholesale roaming, and the justification for regulation. An influential paper by Tony Shortall then hinted that there could be something else. In short, he showed that the wholesale price is not the only competing tool in the hands of visited network operators: those with a large retail roaming customer base have an advantage because they can use it to exchange traffic and attract the biggest visiting operators to their network.

This section extends the model of Shortall (2009), looking more in depth at the "wholesale game", but keeping the three main assumptions, namely:

- That each home operator can only partner with a single network in the visited country.
- That capacity constraints are not an issue in roaming negotiations, and therefore there are no incremental costs associated to international roaming.
- That there is a "competitive floor" to wholesale prices, a minimum below which operators are not interested in selling roaming services. This floor can be interpreted as the average network cost, or as the price of wholesale national roaming (pricing wholesale international roaming below this level would allow foreign operators to compete for customers in the home market for mobile services). The main point is that by pricing at this "competitive floor" a profit per minute above marginal cost is made by the visited operator.

The first assumption will be relaxed in the next section, while it is fairly straight forward to show that when there is not a "competitive floor" above the marginal cost competition would drive prices down to that marginal cost even if just one

network can be selected as a preferred partner[3]. Note in any case that the "competitive floor" coupled with excess capacity might be a realistic assumption to depict roaming negotiations, where agents have bounded rationality. Volumes of international roaming are generally very small compared with overall traffic, roaming contracts cover a fairly short timeframe (usually one year), and estimates of marginal costs are hard to make and subject to great uncertainty.

To begin, a simple numeric example is useful to grasp the main insights of this scenario.

Let's suppose that there are two countries and two operators in each country. Following Shortall (2009) we will suppose that each operator has a fixed amount of traffic to "send" to the other country, and that this amount is not affected by the wholesale price. This might seem at first sight like a quite strong assumption, but it helps focus the analysis in a simple way in the strategic game being played at wholesale level[4].

Country "B" sends 50% more traffic to country "A" than it receives, and in both countries there is a leader with a 70% market share and an entrant with a 30% share. Leaders are denoted in capital letters, and entrants in small letters. The fixed amounts of outbound traffic are:

Operator A	70	Operator B	105
Operator a	30	Operator b	45
Total outbound traffic from country "A"	*100*	*Total outbound traffic from country "B"*	*150*

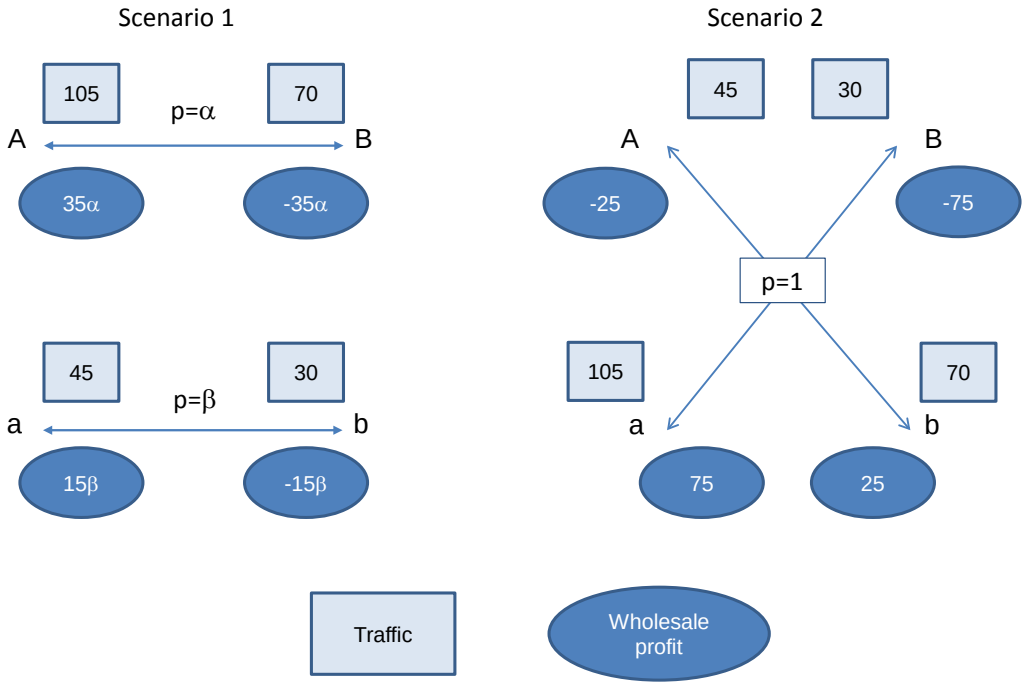
Let's normalize the competitive floor to 1, and assume that it is the same for all four operators. Recall that this means that none of them finds it worthwhile to offer international wholesale roaming below that price level.

[3] See for instance Lupi & Manenti (2009).

[4] We discuss the impact of the wholesale game on the retail market in a later section of the paper, but for the moment note that introducing elasticity in the retail demand would reduce the equilibrium wholesale prices as visited operators try to increase wholesale revenues.

We first want to find out if, at the competitive floor, there is a combination of bilateral relationships that dominates the rest, in the sense that a pair of operators, one from each country, can't find a better alternative than to buy from each other.

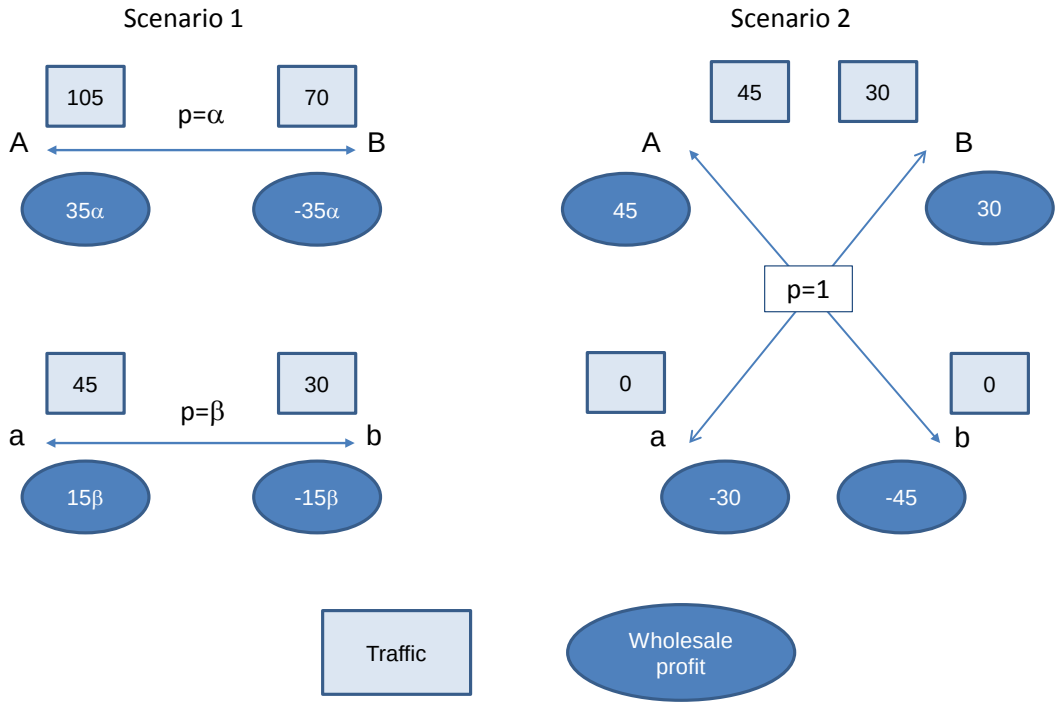
The following graph shows the wholesale profit (outbound costs minus inbound revenues) for the different operators under the two possible combinations of bilateral agreements. Under scenario 2 the leaders commit their traffic to the entrants in the foreign country, and use their negotiating power to force them to accept the competitive floor (p=1). Under scenario 1 the leaders and the entrants partner with their respective peer in the foreign country, and agree on a price that potentially could be above the competitive price.



It is clear from the graph that for the leaders the best alternative is to exchange their traffic: if "B" pays "A" anything between 35 and 75 monetary units they both end up better off than under scenario 1, and for "A" it is a feasible agreement because the price agreed "α" is at least equal to one. We cannot anticipate what the wholesale price between the leaders would be, but we can

define a range: the result of the game is that "A" and "B" mutually agree to exchange their traffic at between one and 2.14 times (75/35) the competitive price[5].

Regarding the entrants, once the customers of the leaders are out of their reach their options are to commit their traffic to each other or to buy from the leaders at the competitive price. The outcome of the two alternatives is represented in the next graph.



Scenario 1 is feasible (p≥1) and better for both entrants if "b" makes a payment to "a" which lies anywhere between 15 and 45. Again, the net seller has more to lose than the net buyer if an agreement is not reached and we could expect the price agreed to be closer to the lower end of the range.

[5] Note however that "A" has more to lose if an agreement is not reached, and therefore we could expect the price to be closer to 1 than to 2.14.

We are now in a position to develop the game algebraically and draw some general conclusions:

Assume there are two countries, "A" and "B". The operators with more outbound traffic in each country (the "leaders") are denoted with capital letters, and the other two with small letters (the "entrants"). Without loss of generality, we will suppose that:

$$T_B > T_A > T_a$$

And

$$T_B > T_b$$

The game begins with the leaders agreeing on a price. Staring with "B", there are two alternatives open: choosing the entrant or the leader in the other country. These are the outcomes in each of the two alternatives:

$$\Pi_B(A) = P_A \cdot (T_A - T_B)$$
$$\Pi_B(a) = P_a \cdot (T_a - T_B)$$

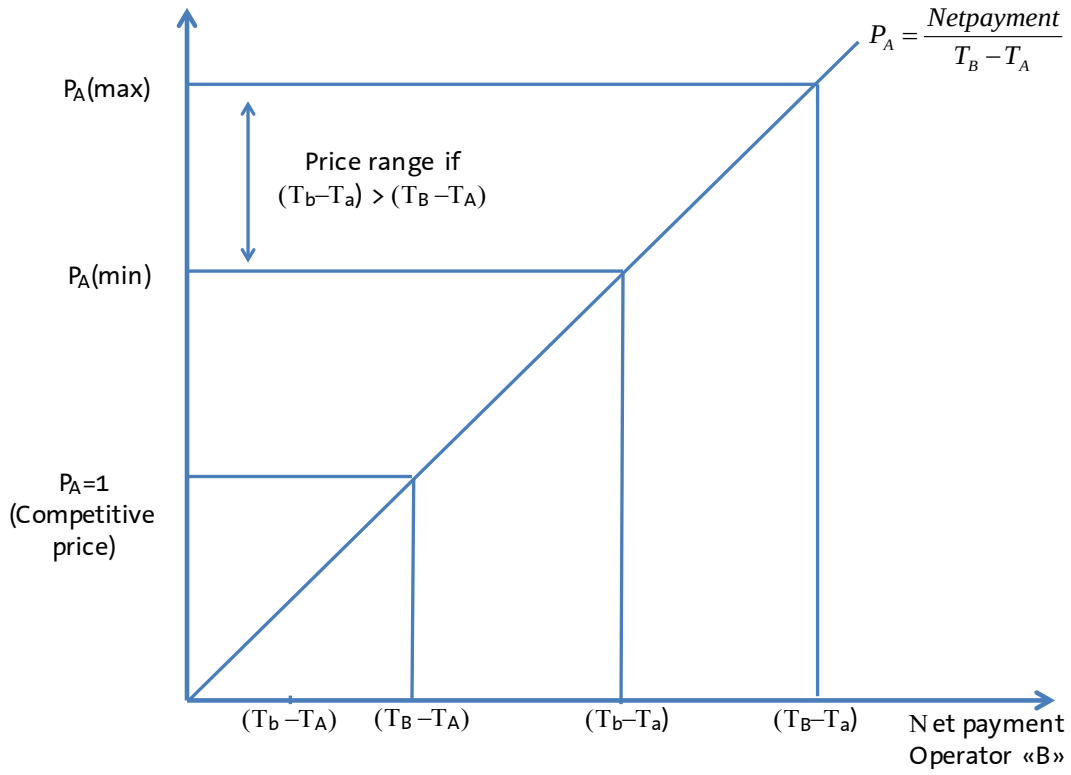
Where P_i is the price agreed by operator "*B*" with operator *i*, and T_i is the outbound traffic of operator *i*.

If we normalize to 1 the lowest price at which the operators would provide wholesale roaming services (the "competitive floor"), we obtain that "B" would choose "A" as long as $P_A \cdot (T_A - T_B) > (T_a - T_B)$, which gives us the highest price that "A" can ask for without losing the traffic of operator "B":

$$\max(P_A) = \frac{T_a - T_B}{T_A - T_B} = \frac{T_B - T_a}{T_B - T_A}$$

This price is higher than p_a=1, because $T_B > T_A > T_a$, and we can therefore conclude that if "B" acts as a price taker, he would be paying a price above the competitive floor.

If “B” does not act as a price taker, but instead recognizes that the bilateral agreement is also the best alternative for “A”, and negotiates the price accordingly, its negotiating power would increase, and would be determined by the best alternative open to “A”, namely to sign an agreement with “b”. Exactly how good this alternative is for “A” depends on its negotiating power with “b”, which in turn depends on how much “b” would lose if it signed with “a” as an alternative to “A”. Intuitively, the bargaining power of each leader when setting the conditions of their bilateral deal depends on the attractiveness of the entrant in its home country as an alternative partner. The following graph tries to make this clearer:



The negotiation between leaders

The x-axis contains the wholesale net payments (outbound costs minus inbound revenues) made by operator “B” to operator “A”. First note that at most “B” would accept to pay a total of (T_B-T_a), which is the payment he would have to make if it partnered with “a” at the competitive price. To determine the minimum price that

"A" would offer to "B", we need to look at his alternative, that is, at the wholesale profit it would make partnering with "b". At the competitive price, the profit of "A" would in this case be (T_b -T_A), but as the graphic shows, "A" is in a good bargaining position vs. "b" because "a" (the alternative for "b" as a partner) has less outbound traffic to offer. At the competitive price, "b" would pay "a" a net payment of (T_b-T_a), which is also the most that "b" would accept to pay to "A", and as consequence the least that "A" would offer to "B"[6].

Some interesting insights can be extracted from the graph:

- When outbound traffic from country "A" is divided evenly between operators "a" and "A" (T_a and T_A are equal), operator "B" can reach an agreement at the competitive price, irrespective of its share in the outbound traffic of country "B".
- When "A" has a large market share in outbound traffic, and operators "b" and "B" share the outbound traffic of country "B" evenly, "A" can extract from any of them the maximum they are willing to pay, and charge above the competitive price. However, this maximum is lower than it would be if outbound traffic market shares in country "B" were more asymmetric.
- As outbound market shares in both countries become more asymmetric, the range between the minimum and maximum prices that could be agreed between the two leaders grows, but it is not possible to say beforehand what the agreed price would be.

Regarding the entrants, let's assume that "b" is the net outbound operator. Since "A" and "B" have already committed their traffic, the options open to "b" are the following:

$$\Pi_b(A) = -P_A T_b$$

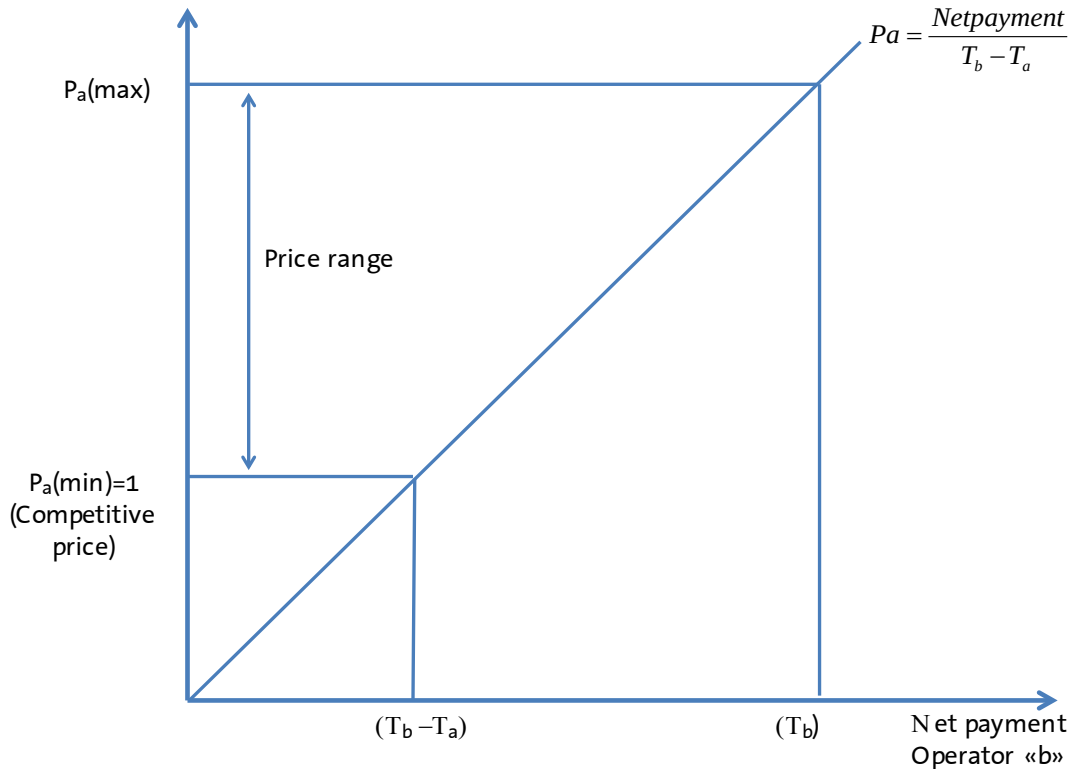
$$\Pi_b(a) = P_a \cdot (T_a - T_b)$$

[6] More rigorously, the least that "A" would offer is the maximum between (T_B-T_A) and (T_b-T_a), because "A" would never sell below P_A=1

Let's also set $P_A=1$ as the lowest price that "A" is willing to offer. Following the same logic as before, this means that "a" can charge "b" a maximum price of:

$$\max(p_a) = \frac{T_b}{T_b - T_a},$$

which is above the competitive price. The bargaining power of "b" comes from the fact that for "a" the agreement between entrants is also the best alternative. Without an agreement, "a" would have to pay to "B" a quantity equal to T_a at the competitive price. Taking into account that "a" would never sell below the competitive price, the two entrants would agree to exchange their traffic for a net payment that lies somewhere between (T_b-T_a) and (T_b).



The negotiation between entrants

Summarizing the main results, this section has shown that when traffic steering is limited to a single network, the leaders and the entrants in the two countries would naturally match with each other. It has also shown that being tied to just

one partner is problematic for the net outbound operators, who usually (but not always) would pay a price above the competitive floor. The root of the problem lies in the fact that the unbalanced traffic has to be routed to a network that is not (or at least not only) selected based on the price, but on the amount of traffic that can be exchanged. This takes us to the next section, where it will be taken into account that operators can select more than one preferred partner and decide how much traffic is sent to each of them.

4. Perfect traffic steering

Up to now the analysis has developed along the lines of Shortall (2010), reaching similar conclusions, namely that even when the traffic is steered to a preferred network there is something inherent in the wholesale dynamics of international roaming that drives the wholesale price up and calls for regulatory intervention of some short. However, it would be wrong to conclude that this is always the case, because we assumed that all the traffic is steered to a single network, and that was the key that gave net inbound operators the power to leverage on their outbound traffic and charge a premium. In reality, nothing prevents operators from committing traffic with several partners, and those paying a premium have a big incentive to work on that direction and develop better traffic steering techniques. Unsurprisingly, operators usually sign preferred network agreements and volume discounts with more than one operator per country, which suggests that the technology already permits the control of the supplier mix[7].

With perfect traffic steering and identical network coverage, it is evident that any unbalanced traffic will be charged at the competitive floor, because if it were not the buyer would just route it to another network. Outbound traffic still serves as a magnet to attract foreign customers, but it does not affect the price of

[7] Starhome, a provider of steering solutions, claims that its product can "... monitor and detect the smallest deviation of roamers' usage levels, profile them, and automatically initiate adjustments of the Steering of Roaming settings to where network targets have not been met, for voice, SMS and data." In addition, it also provides operators "with an immediate snapshot of the usage status and distribution of roamers **across all networks in each visited country**. The automated solution provides efficient steering results by focusing on usage distribution rather than the number of roamers" (Emphasis added). http://www.starhome.com/steering-of-roaming.html

unbalanced traffic, and its attraction power is lower. To see the impact of traffic steering on inbound traffic market shares and total profits, we can use the numeric example of the previous section.

Country "A" receives a total of 150 units of traffic, which can be steered to operator "A" (70 units of outbound traffic) and operator "B" (30 units). Each operator can, through traffic commitment agreements, at least equal the inbound traffic and the outbound traffic[8], and the remaining 50 units would be shared between them in an undefined way.

Country "B" receives 100 units of traffic, and operator "B" could get at most all of it, and at least 55, if operator "b" manages to balance its traffic completely and therefore gets 45 units of inbound traffic, which is the maximum it can aim for.

The results in monetary units are shown in the following chart. For simplicity, it is assumed that all traffic, and not only the unbalanced portion, is charged at the wholesale competitive price. This does not change the net outcome. The results from the previous section are also included.

Operator	Perfect Steering			Single network steering profit
	inbound revenues	outbound costs	Profit	
A	min 70, max 120	70	min 0, max 50	min 35, max 75
a	min 30, max 80	30	min 0, max 50	min 15, max 45
B	min 55, max 100	105	min (-50), max (-5)	min (-75), max (-35)
b	min 0, max 45	45	min (-45), max (0)	min (-45), max (-15)

In terms of inbound traffic market shares, the differences between the two scenarios are the following:

Operator	Single network steering	Perfect steering
A	70%	min 45%, max 80%
a	30%	min 20%, max 55%
B	70%	min 55%, max 100%
b	30%	min 0%, max 45%

[8] Note that with short term excess capacity operators in country "B" would always prefer to pay the wholesale price of outbound traffic in kind (i.e. carry a unit of inbound traffic) rather than cash.

The main point to take away from the charts is that outbound traffic market shares still have an impact on inbound market shares, but the link is severely weakened because now there is an additional competitive tool that was not present under single network steering. Since it is assumed, as discussed in section 3, that the competitive floor is higher than the short term marginal cost, there is a powerful incentive for operators to compete for inbound traffic through means different than price. The quality of the wholesale service itself becomes a critical factor, and more relevance is now given to issues like whether or not intelligent services are available, or whether or not the wholesale invoicing platforms are flexible and make it possible to differentiate prices based on end user identities. For operator A in our example, for instance, quality of service can mean raising their inbound market share from 45% to 80%.

It is important to highlight the differences and similarities between the scenario just described and a hypothetical organised exchange where by definition buyers and sellers are anonymous and mutual roaming agreements are not possible, because that is the normative proposal made in Shortall (2010) and Bühler (2009). The most important similarity is that in both cases the price would be the competitive floor. One difference is that under perfect steering outbound market shares have an effect on inbound market shares, whereas under anonymous trading outbound and inbound shares are independent. A second and more important difference is that the incentives for innovation on wholesale services are very different. To ensure liquidity, the owners of the exchange would have to standardise the wholesale service, and any innovation would have to come from them, or agreed by the users of the exchange through a painful coordination process. Besides, there would be no competitive gains from innovation, because everyone would have access to it at the same time. On the contrary, under perfect steering innovation takes place more naturally because it is the consequence of a competitive process.
It could be argued that steering solutions are expensive and not worth investing in for small operators, and even for big operators when their customers are travelling to remote destinations. However, this does not imply that there is a market failure that calls for regulators to step in. The incentives of operators are

in the right place: they would save money by dedicating resources to traffic steering. If anything, a case could be made for regulators to facilitate access to traffic steering, or to ban visited operators from using "counter steering" techniques[9]. Other measures, like wholesale price controls oriented to cost, would be a step in the wrong direction and would set the incentives for operators in the wrong place: it would no longer make sense to invest in traffic steering, and the need for regulation would be a self-fulfilling prophecy.

5. Consequences for the retail market

Retail roaming is one small piece in the set of services provided to retail customers. Mobile Operators with large sunk and common costs compete for end users, for which on average roaming represents currently below 5% of their expenditure. Although Ramsey pricing is an analytical tool to model regulated monopolies, its basic insight is also applicable to an oligopoly situation where competitors try to find the combination of prices that maximizes customer satisfaction for a given level of revenue per user. Under this premise, and recalling that Ramsey pricing states that for each service prices are equal to the marginal cost plus a premium that is inversely proportional to the impact of a price reduction on total revenues, we can derive some consequences from the results obtained in the previous sections:

The first thing to note is that, in a bilateral relationship, the marginal cost of one unit of outbound traffic is equal to the price of unbalanced traffic[10]. From the previous section we know that, under perfect steering, competition will drive the price of unbalanced traffic down to the level of the competitive floor. Therefore, the benefits of wholesale competition are completely passed on to the retail market.

Secondly, we have seen that outbound traffic has an impact on inbound traffic market shares, which creates additional incentives for increasing the outbound

[9] Note in any case that operators already have "good practice" rules agreed on GSMA that go in this direction.

[10] For an operator "B" partnering with an operator "A" and a price p for unbalanced traffic we have that $\Pi_B = p \cdot (T_A - T_B) = p \cdot T_A - p \cdot T_B$, and $(\partial \Pi_B / \partial T_B) = -p$.

traffic, beyond what would be implied by the price elasticity of the retail roaming service itself. In the Ramsey pricing context, the conclusion is that the bilateral nature of roaming helps bring the retail price down because the mark up is lower than it would other ways be.

In sum, a competitive wholesale market has built-in incentives for retail competition on roaming services. The competitive relative retail price of roaming in the "mobile basket" is then set based on how much value end users give to roaming. Regulators could decide, for instance to foster the idea of a Europe without frontiers, that it would be good to put a cap to the retail roaming price, but it is hard to accept that this policy is based on a market failure in the retail market.

6. Discussion

The main point raised by this paper is that, as long as operators are capable of steering traffic reliably to more than one network in the visited market, and control the amount of traffic sent to each network, the wholesale market is competitive and there are no solid grounds for regulation. When traffic steering techniques are imperfect, the operators making positive net payments have a big incentive to make them better, and the fact that mobile operators in Europe sign bilateral contracts with prices for unbalanced traffic well below the regulated caps suggests that these techniques are already available.

If wholesale price controls are continued, as seems likely at least in the short term, regulators should adopt a cautious approach, because if the regulated price for wholesale international roaming is set too low, it can be used by foreign operators to enter the domestic markets, which in practice would amount to using the Regulation of roaming to set a price for the wholesale national roaming across the EU. This contrasts with the fact that there are no price controls obligations for that market anywhere in Europe, and it is not even one of the relevant markets that National Regulators have to analyse because the European Commission itself has considered it structurally competitive.

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