R O M E
Research On Money in the Economy

No. 09-08 – October 2009

Pricing of Payments

Malte Krüger

ROME Discussion Paper Series

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ISSN 1865-7052

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Abstract

The pricing of payments has received increasing attention of regulators. In many cases, regulators are concerned that consumers do not face cost based prices. They argue that without cost based prices consumers will make inefficient choices. In this paper, it is argued that both, economics of scale and the particular laws governing pricing in two-sided markets provide a case against cost based pricing.

JEL-Classification: L14, L41, E42

Keywords: Two-sided markets, interchange fees, surcharging, pricing strategies

Acknowledgements: I appreciate the helpful comments of participants of workshops held at the University of Bayreuth and at the E-Finance Lab. All errors are mine.

1 Retail payments in the spot light

Traditionally, central banks have played two roles in the payments system. They have been offering certain payment services themselves (mostly settlement and possibly clearing services) and they have been overseeing the participants in the payment system. On the whole, the basic aim was very much one of limiting risks and thus reducing the potential problem of payment system crisis affecting the other sectors of the economy. Consequently, they mainly focussed on wholesale payments. The Bundesbank and its position in the payment system are a case in point. Art 3 of the Bundesbank Act states that the Bundesbank "shall arrange for the execution of domestic and cross-border payments." In the past, this somewhat vague definition has been interpreted in a fairly restrictive sense as: „Issuing of bank notes and provision of central clearing and settlement functions for giro, check and direct debit payments." (Pfleiderer and Schieber 1988, 172).

On the face of it, the mandate of the Eurosystem does not seem to differ very much from the old mandate of the Bundesbank, quoted above. Article 105(2) of the Treaty establishing the European Community and Article 3 of the Statute of the European System of Central Banks state that "the basic tasks to be carried out through the ESCB shall be […] to promote the smooth operation of payment systems." The corresponding Article 22 in the Statute of the ECB reads as follows:

> "The ECB and national central banks may provide facilities, and the ECB may make regulations, to ensure efficient and sound clearing and payment systems within the Community and with other countries."[1]

However, what has been changing, in recent years, is the interpretation of such a mandate. A number of central banks, including the European Central Bank, have interpreted the mandate to 'promote the smooth operation of payment systems' to apply not only to wholesale but also to retail payments. Nowadays, central banks intervene in pricing of retail products (i.e. the bank to customer relationship), they provide authoritative opinions on new retail payment products and they even develop such products on their own.

One example of the current involvement of central banks in retail payments is the ECB's activities in the SEPA project.[2] Other examples are the initiatives of some central banks like, for instance the Dutch and the Norwegian Central Banks, to promote cost based pricing in retail payments. They have carried out cost studies in order to determine the relative costs of various means of payments. Based on these finding they now ponder ways to steer the payment system into the direction of an 'efficient' mix of payments instruments.[3]

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[1] The Bundesbank Act was modified in 2002, in order to align it with the ECB Statute. Interestingly, the wording chosen differs somewhat. The term "efficiency" is not used. Rather, law makers inserted the following term in Article 3: "and shall contribute to the stability of payment and clearing systems". This provision sounds more like the traditional idea of a central bank's responsibility in the payment system.

[2] 'SEPA' stands for 'Single Euro Payments Area'. The ECB is actively involved and threatens banks with regulation if they do not implement SEPA payment products by some deadline.

[3] The increased central bank interest in retail payment systems has been mirrored by an increasing number of anti-trust cases covering various issues of conduct in retail payment systems. One of the most controversial aspects that has come under anti-trust scrutiny is the setting of multi-lateral interchange rates (MIF). In some

Some academics have supported this drive for cost based pricing. Those economists, however, who have applied the two-sided markets theory to the payments market, are critical of cost based pricing. This paper attempts to reconcile these two views of payment pricing.

2 Payments regulation and cost based pricing

2.1 Pricing of payment services for consumers

2.1.1 Cost based pricing and the 'war on cash'

A few years ago, credit card organisations have declared the 'war on cash' and started to. pursue an aggressive strategy for promoting their own card-based payment products as substitutes for cash.[4] The position of the card schemes is understandable. But, somewhat paradoxically, central banks (the issuers of bank notes) have proven eager support troops in the war on cash. For instance, representatives of the ECB want banks to become more active in replacing cash:

> 'To conclude, I encourage the banking industry to continue its work on making cashless payment instruments more efficient. This is the only way that those instruments can attract cash payments.' (Tumpel-Gugerell 2006).

The Bank of Norway has 'encouraged' (or 'nudged') banks to introduce cost-based pricing with the explicit aim to reduce paper-based means of payment – including cash. This has led to a stronger use of electronic payment instruments.[5] This action has been based on the notion that cost based pricing will improve efficiency.

> 'Prices should reflect the *value* of the product or service and the *cost* of producing it. Prices that reflect *relative costs* of producing various payment services provide an incentive for users to select services that meet their needs at the lowest possible cost. This promotes correct use of resources and increases the efficiency of the payment system.' Gresvik and Øwre (2003, 3)

The Dutch Central Bank participates in the 'National Forum on the Payment System' which has come up with a study on the costs of payments.[6] The study concludes that it would be efficient to substitute cash payments above 12 EUR by debit card payments. The Forum proposes to scrap charges for small value electronic payments and to increase the number of POS terminals. Moreover it explores whether inefficient means of payment methods could be discouraged by charging transaction fees.[7]

> 'If the choice is between paying in cash and using the debit card, the latter appears to be the more efficient for payments over eur 11.63. On the basis of these results, and taking into account various relevant aspects such as ease of use and safety, participants in the Social Platform on Payment Systems will discuss how the public may be encouraged to use the most efficient payment products.' (DNB 2004, 64)

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cases, the authorities mandated cost based pricing for such collectively set fees. a discussion f the interchange debate is beyond the scope of this paper, however. See Rochet (2007) for a recent survey.

[4] See, for instance, the statement of Alexander Labak, president of MasterCard Europe: 'What is the essence of SEPA? I believe that SEPA is all about winning the ‚War on Cash' in Europe.' (Labak 2005)

[5] For instance, from July 2001 on banks were no longer allowed to receive float income. See Norges Bank, Annual Report on Payment Systems, various issues and Gresvik and Øwre (2002, 125).

[6] National Forum on the Payments System (2004).

[7] See also Brits and Winder (2005), 34.

The Bank of Finland even developed an e-purse scheme in order to speed up the technical development in Finnish retail payments. The system, 'Avant', was launched in 1993 and sold to a consortium of large banks in 1995.[8] However, it never took off and was discontinued in 2006.

Academics, as well, have joined the central banks in demanding cost based pricing. Thus, Van Hove has been arguing for years that cost based pricing should be used to reduce supposedly costly cash payments and encourage card payments.

> 'If consumers do not face direct charges when deciding which payment instrument to use at the POS, the result will be overuse of inefficient payment instruments that are costly to society. And, crucially, all consumers end up footing the bill, even those who do try to pay in the most efficient way. Hence, there should be explicit fees; the fees should be in part per-transaction (since flat fees per year, for example, result in a marginal cost of zero, and hence provide no incentive to optimise one's payment behaviour) 17; and, finally, the fees should give information on the relative social costs of the payment instruments (in other words: they should be cost-based).' Van Hove (2007, 26)

He is supported by De Grauwe, Rinaldi and Van Cayseele (2006, 70) who estimate that the introduction of cost based pricing and the resulting increase in card usage would lead to a reduction of resource costs of EUR 750 million in a group of 19 European countries.

It is not always clear to whom the quoted demands are addressed. However, so far, regulatory action has always been directed at banks and bank-owned payment organisations. A prominent example is the action taken by the Bank of Norway.

2.2 The canonical case with rising marginal costs

The logic of cost-based pricing is evident for anyone having enjoyed an introductory course in economics. The optimal production point is characterised by the well-known condition: marginal rate of substitution in consumption = marginal rate of substitution in production = inverse price ratio. Or, less technical: marginal utility = marginal costs = price.

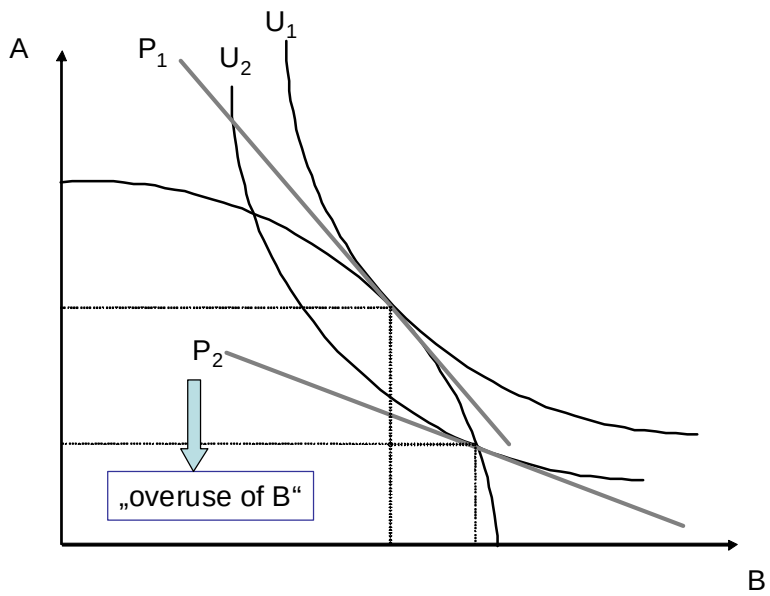

Figure 1: The effects of wrong pricing in the standard textbook model

[8] See Jyrkönen and Paunonen (2003), 11-12.

Wrong pricing (i.e P_2 in Figure 1) leads to an overprovision of one good (B in this case) and underprovision of the other (A in this case). As a result, there is a loss in welfare. This is the argument underlying the demand of regulators for cost-based pricing.

Although, the underlying model clearly is the standard textbook model in economics, it has to be taken into account that there are quite a few cases were marginal cost pricing is not optimal.

2.3 Pricing under economies of scale

Under economies of scale, sole reliance on marginal cost pricing would not be feasible because producers' costs would be above revenues. In such a case, there are basically three ways to gain sufficient revenues to recover costs:

- marginal cost pricing plus a tax financed subsidy,
- marginal cost pricing plus membership fees (two-part tariffs) and
- mark-up pricing.

The first solution is sometimes described as 'optimal' or 'efficient'. These statements are based on the assumption that an allocation neutral tax could be levied. However, since the practical relevance of the 'neutral tax' is doubtful it seems advisable to leave this 'mystical beast' in its cave. Therefore, in the following, only the last two options will be discussed.

2.3.1 Mark-up pricing

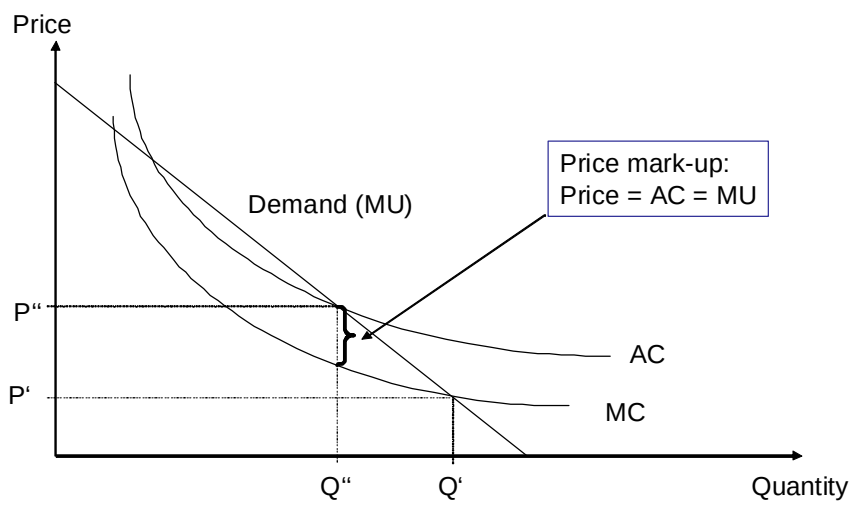

Figure 2: Mark-up pricing

Note: MC: marginal costs; AC: average costs; MU: marginal utility.

In the case of homogenous demand, there is a uniform mark-up on marginal costs. However, in the case of heterogeneous demand, prices should be differentiated. In this

case, under the condition of cost recovery, a welfare maximum will be reached if the following condition is met:

$$(1) \quad \frac{\frac{P_1 - MC}{P_1}}{\frac{P_2 - MC}{P_2}} = \frac{1/\varepsilon_1}{1/\varepsilon_2}$$

where $P_{1/2}$ are prices, MC are marginal costs and $\varepsilon_{1/2}$ are price elasticties of demand. Equation (1) states that the efficient mark-up (or 'tax') is inversely proportional to the demand elasticities of the two groups. This pricing rule is known 'Ramsey pricing'. In the present context, this rule is particularly interesting because it provides a rational to deviate from pure cost-based pricing. In order to reach the constrained Ramsey optimum, producers have to take properties of the demand side into account when deciding prices for distinct user groups. Prices reflect costs, on average. But for each sub-group prices deviate from marginal <u>and</u> from average costs.

Mark up pricing would allow producers to recover costs. However, this advantage comes at a price. Since, marginal costs and marginal benefits are not equated, this solution is not efficient. Still, it can be regarded as pragmatic way to deal with economies of scale in regulated industries.

2.3.2 Two-part tariff and homogeneous demand

In markets with economies of scale, suppliers can also use a two-part tariff. One part of the tariff is fixed, independent of the quantity consumed and the other is volume dependent. The first part can be understood as an 'entry fee' or 'connection fee'. Examples would be monthly phone fees or annual card fees.

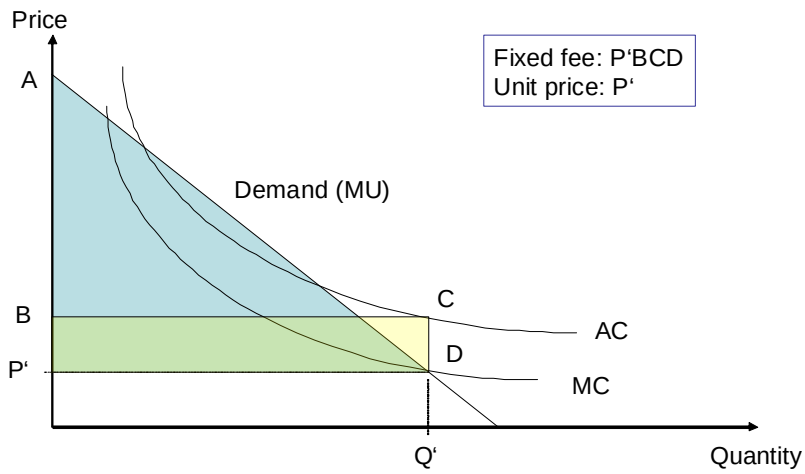

Figure 3: A two-part tariff with homogenous demand

Note: MC: marginal costs; AC: average costs; MU: marginal utility.

Such a tariff allows suppliers to implement marginal cost pricing and reach the efficient level of output Q'. Under a cost-recovery rule, each customer has to pay an entry fee of *Q'(B-P')/n* (where *n* is the number of customers) and a price per unit of *P'*. [9]

The two-part tariff supplements marginal cost pricing with a fixed fee. In a wider sense, such a tariff could still be interpreted as 'cost-based'. However, when taking heterogeneous demand into account, the determination of the fixed fee is, once again, driven by characteristics of the demand side. The maximum fee is equal to consumer surplus (given marginal cost pricing). Any set of fees below this maximum fee and above cost recovery is feasible. Whatever feasible fee combination chosen, the allocation will not be affected. A particular consumer will always face the same unit price and thus demand the same quantity – no matter how high the entry fee is (as long as the entry fee is smaller than consumer rent).

So, from the point of view of efficiency, all that matters is that the net price equals marginal costs. The entry fee only serves the purpose of generating sufficient revenue to sustain production. Once again, the total price per good paid by a particular user (fixed fee per unit demanded plus unit price) does not have to reflect average costs and may vary across groups of users.

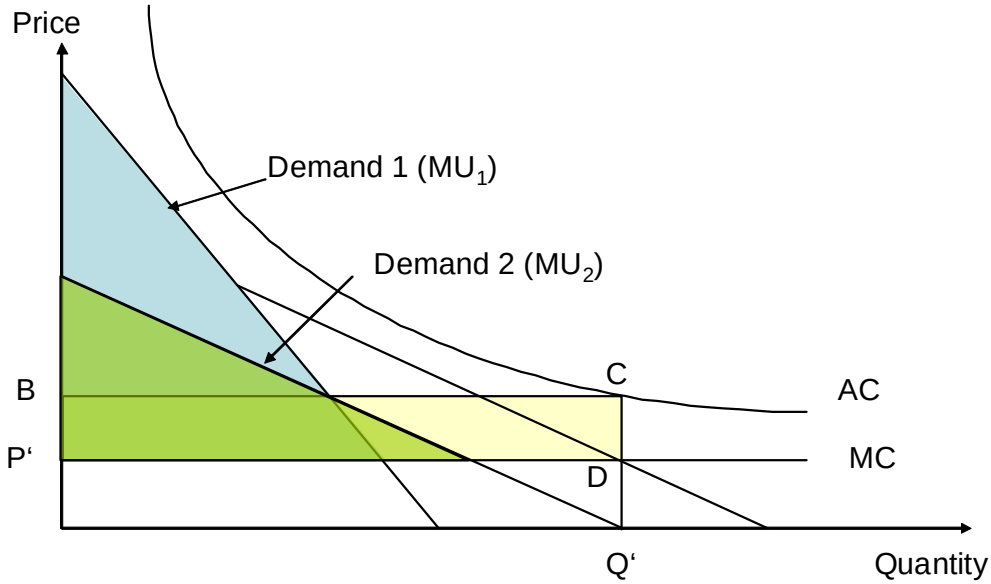

Figure 4: A two-part tariff with heterogeneous demand

Note: MC: marginal costs; AC: average costs; MU: marginal utility.

2.3.3 Approximative pricing strategies

Under economies of scale, cost based pricing would have to be implemented via Ramsey pricing or a two-part tariff. Today, in many payment systems, consumers do not pay any per transaction fees. This is one of the central points criticised by regulators. However, the observed pricing structure may be close to an efficient two-part tariff.

[9] A monopolist would charge the same unit price and a higher fixed fee of *(A-P')Q'/2n*.

What is often observed is that retail customers pay fixed fees per period whereas wholesale customers pay a per transaction fee. Card payment schemes are a case in point. In many countries card holders pay an annual fee, either explicitly as in the case of charge cards or implicitly as in the case of debit cards that are often bundled with a giro account. Merchants however, pay a fee per transaction or a combined fee per transaction and a percentage of the EUR value of the transaction. Both, the retail and the wholesale pricing strategy can be interpreted as close approximations of a two part-tariff.

Consider a simple cost function of the following type:

(2) $c = a + bx$

where a are fixed costs and b are variable costs.

Assume that b is much smaller than a. In this case, for small volumes of transactions, costs will be close to a. Indeed a service provider could charge a fixed fee (f_f) with

(3) $f_f = a + bE(x^r)$

where x^r is equal to the average number of transactions of a retail customer

Given the assumptions made, f_f would be fairly close to cost based pricing for all retail clients (see 'small customers' in Figure 5).

For large volumes of transactions, costs would be close to bx. In this case, a service provider could charge a per transaction fee (f_v) with

(4) $f_v = a/E(x^w) + b$

where x^w is equal to the average number of transactions of a wholesale customer

Such a variable fee would also not deviate much from cost based pricing (see 'large customers' in Figure 5).

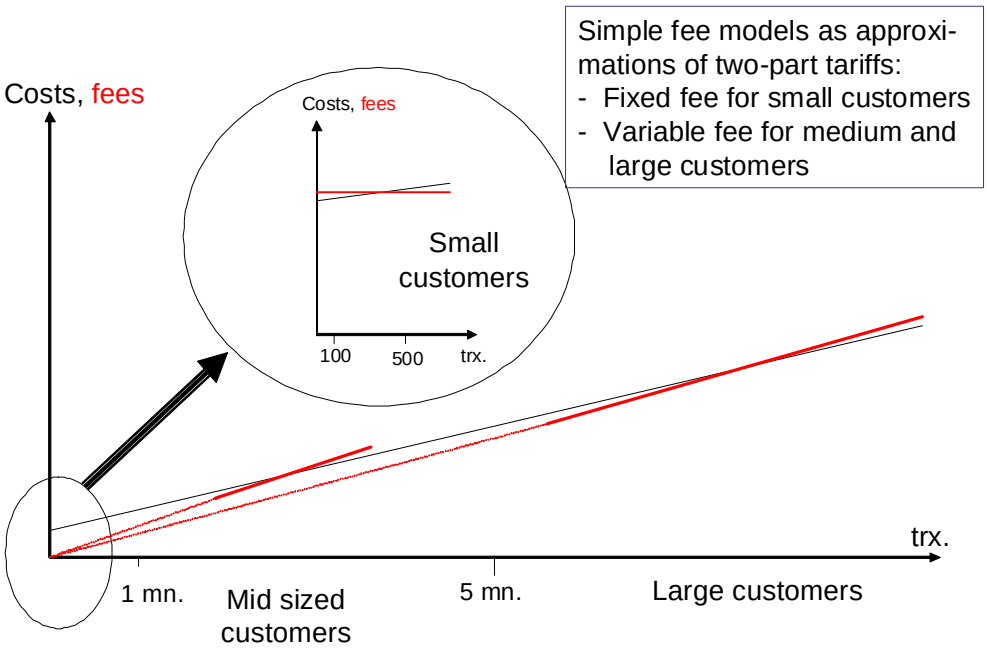

Figure 5: Approximative pricing strategies

Given cost structures that may actually be quite common in payment systems, the observed pricing strategies of financial institutions need not constitute a large deviation from

efficient pricing. Indeed, when taking the costs of metering and itemized billing into account, such simple pricing rules may well be superior to the 'correct' two-part tariff.

Of course, as *b* gets larger relative to *a*, the case for a per transaction fee for retail clients becomes stronger. OTC cash transactions (in-payments or withdrawals) would be a case in point. Electronic direct debits or credit transfers would be a case with very low *b* and ATM transactions would be a somewhat intermediate case.

2.4 Pricing in two-sided markets

There is a substantial body of literature on two-sided markets and most economists who have worked on this topic agree that in two-sided markets cost based pricing does usually not lead to efficient outcomes.[10] A standard result is that the elasticity of demand – both of merchants and card holders – matters for relative prices on the acquiring and the issuing side. In a much quoted paper, Rochet and Tirole (2003) have analysed optimal pricing in two-sided markets under different assumptions. First, they assume a monopolist platform provider. They are analysing a market with two distinct groups of customers, 'buyers' and 'sellers'. Usage of the platform is the product of the two demands on the two sides of the market. Assuming log concave demand functions they find that the price structure p^B/p^S is given by the ratio of elasticities (Rochet / Tirole 2003):

$$(5) \quad \frac{p^B}{p^S} = \frac{\eta^B}{\eta^S}$$

In the case of competing platforms the optimal price structure is

$$(6) \quad \frac{p^B}{\eta_o^B} = \frac{p^S}{\left(\eta^S/\sigma\right)}$$

η_o: own brand elasticity, σ: singlehoming index

Finally, they analyse the case of Ramsey pricing with balanced budget:

$$(7) \quad \frac{p^B}{\eta^B}\left[\frac{V^B}{D^B}\right] = \frac{p^S}{\eta^S}\left[\frac{V^S}{D^s}\right]$$

V^i: consumer surplus (i=S,B)

If demand is linear (6) and (7) are equal to (5). Thus, for a wide array of environments the result is basically the same: the price of one group relative to the other is determined by relative elasticities. Costs do not come into play.

Baxter (1983) was the first to point out that, in this case, it may well be welfare improving to introduce a transfer payment from one side of the market to the other. Such a transfer can be brought about by a multilateral interchange fee.

2.5 Cost based pricing in two-sided markets with and without surcharging

When assessing the issue of cost based pricing, two different institutional set-ups have to be distinguished:

[10] See, for instance, Rochet and Tirole (2003, 77) or Wright (2004, 47). A dissenting view can be found in Frankel (1998) and (2007).

- payment systems without surcharging
- payment systems with surcharging

A surcharge is a fee levied by the seller on the buyer for the use of a particular payment instrument. For instance, a merchant may demand a fee of X EUR or X % if a buyer wants to pay by check or credit card. Alternatively, a merchant may offer a rebate for the use of a particular payment instrument. In the following, such rebates will be treated as negative surcharges.

If a merchant does not surcharge, he has to take average payment costs of all payment instrument accepted into account when calculating final prices. From the point f view of buyers, final prices will be independent of the payment instrument used.

A market without surcharging has been depicted in Figure 6. In such a market, there are typically four players and four types of payment costs. Moreover, there are two prices for payment services and there may be an interchange fee.

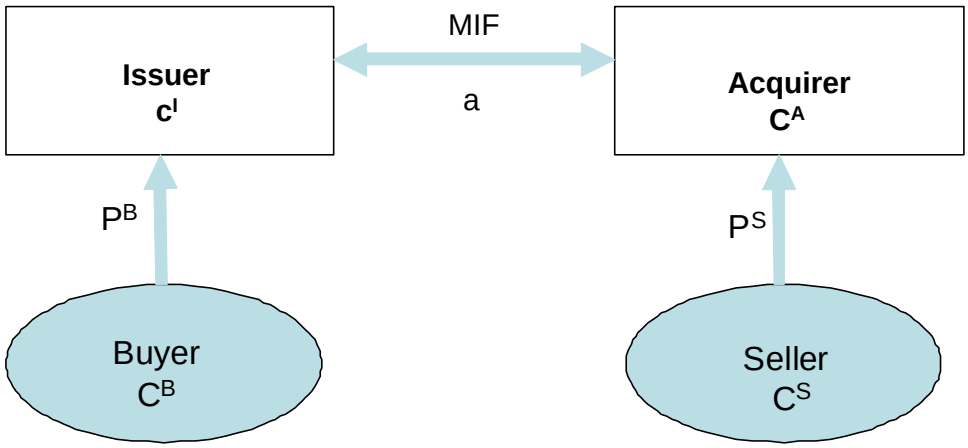

Figure 6: The payment market without surcharging

$C^{I/A/B/S}$ are costs incurred by issuers, acquirers, buyers and seller respectively, p^B is the service price buyers have to pay to issuers and p^S is price sellers have to pay to acquirers; a is a multilateral interchange fee[11]

In such a market, cost based pricing of issuers and acquirers would imply

(8) $p^B = c^I$

(9) $p^S = c^A + a$ with $a = 0$

In such a set-up, buyers would seek to minimise their total payment costs c_T^B

(10) $c_T^B = p^B + c^B$

Under cost based pricing, total payment costs of buyers would equal

(11) $c_T^B = c^I + c^B$

[11] Some models use the concept of 'payment benefits'. This concept has been criticised by McAndrews and Wang (2006) who argue that only costs should be included. However, both views can be easily reconciled if costs are viewed as 'net costs', i.e. costs minus benefits.

Thus, the costs of payment on the acquiring side would not be taken into account. Suppose, there are two payment instruments '1' and '2' with costs on the acquiring side of

(12) $\left(c_1^A + c_1^S\right) < \left(c_2^A + c_2^S\right)$

In this case, an interchange 'a' with

(13) $a = \left(c_2^A + c_2^S\right) - \left(c_1^A + c_1^S\right)$

could provide buyers with an efficient price signal that covers costs on the acquiring side of the market. This could be brought about either as

- an interchange from acquirer to issuer in system 1
- an interchange from issuer to acquirer in system 2

In both cases, the relative costs of payment instrument 2 would be raised for the buyer, so that the total costs of the buyer would not only reflect costs on the issuing side of the market but all payment costs.

The crucial point is that cost based pricing will not lead to an efficient outcome. If issuers and acquirers use cost based pricing buyers will not receive efficient price signals. Thus, mandating that banks as issuers of cards or cash should charge cost based prices will not lead to an efficient outcome.

In the past, surcharging has been little used. One reason was that many payment schemes rule out surcharging. In recent years, this has been changing to some extent. Members of the European Union are in the process of transposing the Payment Services Directive into national laws. For most of these countries, this will imply that surcharging cannot be forbidden anymore by payment schemes. Thus, the rule will be that surcharging is legally possible. Therefore, it has become increasingly interesting to tackle the issue of surcharging and how it affects the payment market.

If surcharging is possible, there is one more payment price to be considered (see Figure 7).

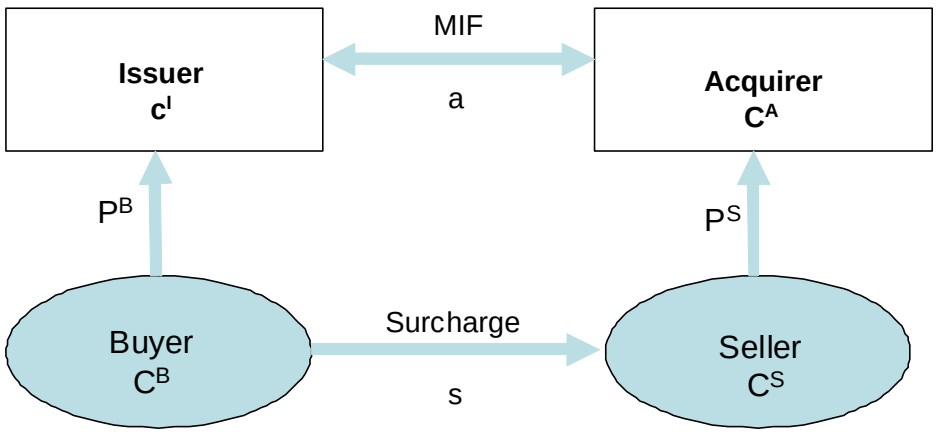

Figure 6: The payment market without surcharging

In the following, payment pricing will be analysed on the basis of two assumptions

- there are no costs of surcharging
- perfect competition between sellers (merchants)

Under these assumptions, sellers will demand a surcharge for accepting the more expensive payment instrument ('perfect surcharging'). If it is again assumed that there are two payment instruments 1 and 2 and that 2 is more expensive than 1, the surcharge will be equal to

(14) $s = \left(c_2^A + c_2^S\right) - \left(c_1^A + c_1^S\right)$

In this case the total payment costs for the buyer will be

(15) $c_{T1}^B = p_1^B + c_1^B = c_1^I + c_1^B$

(16) $c_{T2}^B = p_2^B + c_2^B + s = c_2^I + c_2^B + s$

So, in this case, buyers have an incentive to select the payment instrument that is least costly for the economy as a whole.

Note that, in this case, MIF is neutral. If system 2 introduces a MIF of X EUR from acquirer to issuer, this will raise costs of acquirers and thus the seller price. Ceteris paribus, this will lead to a higher surcharge. At the same time, issuers' net costs will fall, implying a lower issuer price. So, the surcharge will rise by X EUR and the issuer price will fall by X EUR. Total buyer payment costs of payment instrument 2 (c_{T2}^B) will not change. An interchange, payable by issuers would lower the surcharge but raise the issuer price. The ultimate result would be the same.[12]

Thus, in an environment with perfect surcharging, the decision of issuers and acquirers about interchange fees become irrelevant for the efficiency of payment pricing. As long as the entire system is characterised by

- competition between issuers
- competition between acquirers
- competition between merchants
- zero costs of surcharging

issuers and acquirers may use cost based pricing or not – this is irrelevant for the efficiency of the payment system.

3 Conclusions

Regulators and some academics are criticising the payment pricing policy of financial institutions. The main argument is that current pricing is inefficient because consumers are not facing cost based pricing. Thus, they would not be provided with the correct signals to make efficient choices.

[12] See also Carlton and Frankel (1995) and Gans and King (2003).

While the emphasis on consumers as final users of payment services is correct, this critique is partly based on misconceptions regarding payment pricing:

First, there are economies of scale in the payment system and payment pricing can often be interpreted as a simplified type of non-linear tariff. A two-part tariff consisting of a fixed fee and a fee per transaction can be approximated by

- a fixed fee (for retail clients with few transactions)
- a fee per transaction (for wholesale clients with many transactions)

Thus, zero transaction fees need not constitute large deviations from the efficient solution.

Second, payment systems are networks and financial institutions have to take the particularities of pricing in two-sided markets into account. In a network, such as four party payment networks, the relative costs (or cost-benefit ratios) on both sides of the market have to be taken into account. If merchants do not surcharge, this can only be done via the introduction of an interchange fee that is not cost based. If there is perfect surcharging, the interchange rate is irrelevant. It is not necessary but it also does no harm.

Third, if there is surcharging, it is not important whether the two separate fees (surcharge and issuer fee) are cost based or not. Rather what counts is that the sum of the two fees properly reflects costs (net of merchant benefits).

The implications for payment regulation are as follows:

- Banks' pricing may be closer to efficiency than assumed by regulators.
- MIF may have less importance than has been assumed, so far.

It is necessary to get a better understanding of the surcharging behaviour of merchants. Most studies show that surcharging is not widely used even if permitted.[13] Moreover, where it is used the size of the surcharge does not always seem to reflect relative costs for merchants. Thus, market power of merchants may also be an issue. Therefore, it needs to be analysed whether the observable surcharging behaviour is due to

- explicit rules prohibiting surcharging
- costs of surcharging
- (expected) consumer resistance
- interchange rates that are properly balancing merchant and consumer benefit
- market power of merchants.

Fourth, as far as anti-trust authorities and payment regulators are concerned, the first best strategy seems to be to ensure that there is competition in each of the sectors discussed rather than trying to micro-manage the payment system.

A case in point is the recent trend in European payment regulation. The EU Commission came up with a report on European card payment systems that showed that there were huge profits in card issuing in many countries (European Commission 2006).

[13] See Bolt, Jonker and van Renselaar (2008), IMA Market Development (2000), ITM Research (2000).

This finding was extensively used in the proceedings against MasterCard (European Commission 2007). However, supposing the empirical findings are correct, these may well come from insufficient competition in the demand for consumer credit. As pointed out already by Baxter (1983), credit card issuers are in two markets: payments and consumer credit. If there is a lack of competition in the market for consumer credit, regulators will not improve things significantly in this market by acting as price regulators and setting interchange fees to zero.

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