

Regulators have capped the charges that mobile operators can levy on other networks for connecting calls to their subscribers. But as new research by **Christos Genakos** and **Tommaso Valletti** shows, this leads to a 'waterbed' effect, where prices rise elsewhere. Their analysis has implications for recent EU caps on 'roaming charges'.

## Regulating the mobile phone industry: beware the 'waterbed' effect

**T**he prices that mobile operators charge other network operators (fixed or mobile) for connecting calls to their subscribers – so-called termination charges – have become a hotly debated issue among regulators and academics worldwide. The level of these charges is perceived to be high both in absolute terms, but also in relation to similar prices charged by fixed network operators.

Industry analysts argue that such charges may inhibit the future growth of telecoms services. What's more, especially for fixed-to-mobile termination rates, a large body of theoretical research in economics has demonstrated that independently of the intensity of competition for mobile customers, mobile operators have an incentive to set charges that will extract the largest possible surplus from fixed users.

This problem has provided the justification for regulatory intervention to cut termination rates. But reducing the level of charges can potentially increase the level of prices for mobile subscribers. This is what is known as the 'waterbed' effect, where pressing down prices in one part of firms' operations causes another set of prices to rise. Understanding and quantifying the effect – as our research aims to do – is critical for assessing consumer benefits from mobile termination regulation.

### Regulating termination charges

Mobile termination charges have been an important issue ever since 1997 when the first regulatory debate started in the UK. Price controls on the two largest operators were put into effect from 1998 to 2002, requiring termination

charges to be reduced by 9% per year in real terms.

After a lengthy consultation and investigation, the UK telecoms regulator (then called OfTel) concluded at the end of 2001 that mobile termination charges were still substantially in excess of cost. It proposed additional price controls for the next four years on the four major mobile companies, Vodafone, O2, Orange and T-Mobile. The companies objected and the matter was referred to the Competition Commission.

The Commission broadly endorsed OfTel's proposals. It concluded that competition in the mobile industry did not constrain fixed-to-mobile termination charges and that a price cap was the only remedy



likely to address these detriments effectively. The Commission considered that this would yield significant benefits without an increase in average retail prices or a significant loss of retail subscribers. In fact, it was during these investigations that the term waterbed was first coined by the late Paul Geroski, chairman of the Competition Commission.

Other countries have followed the UK's lead. The European Commission introduced a new regulatory framework for electronic communications in 2002. Every member state of what was then the EU-15 was obliged to conduct a market analysis of the mobile termination market and, to the extent that market failures were found, remedies would have to be introduced. Indeed, all the countries that completed the analysis did find problems and imposed (differential) cuts to termination rates.

In 2005, the New Zealand Commerce Commission introduced similar regulation and while it was convinced that the waterbed effect is a theoretically general phenomenon, it doubted its empirical importance. Similarly, the most recent termination rate proposals by Ofcom (OfTel's successor organisation) acknowledge the importance of the waterbed effect, but question whether the effect is 'complete', arguing that this can only be the case if the retail market is sufficiently competitive.

### Analysing the waterbed effect

Mobile operators compete in the marketplace to win subscribers, who then provide a stream of revenues. They compete by offering attractive prices for subscriptions and outbound mobile calls and also, in the case of monthly subscribers, subsidised handsets. In doing so, they consider all the revenues that will accrue from acquiring a customer and all the costs of servicing

that customer. Part of their revenues are the charges that they receive from other networks for connecting calls to their subscribers.

When considering its pricing policy, a mobile operator will take these termination revenues into account. The higher these revenues, the lower the total price an operator would charge its customers. It makes sense for any mobile operator to pass-through some of its revenue to consumers, because by lowering prices, it increases the number of mobile subscribers, which in turn increases the termination revenues earned.

Of course, the reverse is also true: if regulation reduces termination charges and hence revenues, operators will have to raise their prices to subscribers. To assess how widespread this waterbed effect might be, we need to analyse how it can emerge under different market scenarios.

If the mobile market were characterised by very strong (perfect) competition, then operators would expect to make zero excess economic profits. Consider now what would happen as a result of an increase in termination charges. This would increase the revenues associated with each new customer, hence increasing their value to mobile operators. Mobile operators would start competing by lowering their prices to acquire these new customers.

The result of competition would be a complete waterbed effect: any additional profit would be simply passed on to consumers via lower prices, so that economic profits remain zero. Under this market structure, the introduction of regulation to cut fixed-to-mobile termination charges would affect the structure of prices but not the overall profitability of operators.

While competition appears to be strong in the mobile industry, both regulators and market analysts agree that operators possess a significant amount of market power. Hence, there is also a need

to consider the nature of the waterbed effect when competition is not perfect.

Consider the extreme case of a monopolist. Economic theory suggests that a firm with full market power maximises profits by setting the price at the point where marginal revenue equals marginal cost. In other words, the price is such that the extra revenue the monopolist earns from selling his last unit is equal to his extra cost of producing this unit.

Consider again the effect of an increase in termination charges. Assuming for simplicity that each subscriber generates the same amount of termination revenue, this would increase the revenue earned on each consumer. As a result, the monopolist would now charge a lower price to attract more customers, again causing the waterbed effect.

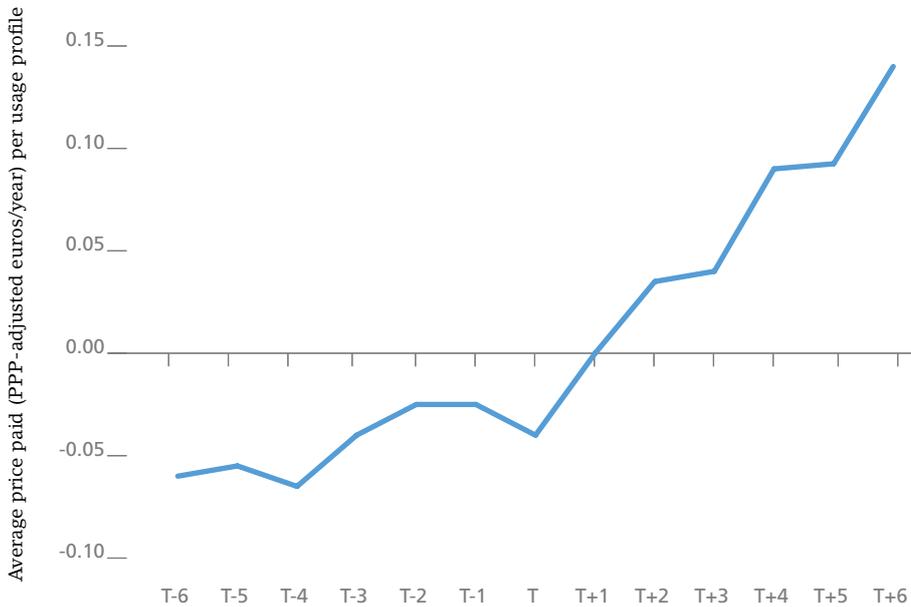
Notice that the waterbed effect would not be complete now, as the firm would pass-through as lower prices only part of the extra revenue. Hence, even in the extreme scenario of a firm possessing complete market power, a reduction in termination charges is expected to cause lower marginal revenues that would increase optimal subscription prices.

In practice, mobile markets worldwide are dominated by a small number of firms. Competition among them is expected to be somewhere between the two extreme scenarios of perfect competition and monopoly. Under these more general (oligopolistic) market conditions, the same economic logic applies.

The size of the waterbed effect is key to understanding the costs and benefits of termination charges regulation



Figure 1:  
Average mobile phone usage price around the introduction of regulation of fixed-to-mobile termination charges



Quarters around the introduction of regulation (T), so T-1 means one quarter before the introduction of regulation

Price caps on termination charges have led to significant price increases for mobile phone subscribers

The magnitude of the waterbed effect will depend on the intensity of competition as well as the shapes of the demand and cost functions underlying the mobile industry. The previous two extreme market structures provide us with the bounds within which we expect the waterbed effect to lie.

### Measuring the waterbed effect in the mobile phone industry

Despite the importance of the waterbed effect and the wide range of market conditions under which it arises, until now, there has been no systematic evidence to back up the theory. The main purpose of our research is to examine the existence and magnitude of the waterbed effect in the mobile phone industry. Using a new dataset of mobile operators across more than 20 countries during the last decade, we analyse the impact of fixed-to-mobile termination rate regulation on prices and profit margins.

Both the timing of the introduction of regulated termination rates and the severity with which they were imposed across mobile operators in practice varied widely, driven by legal and institutional characteristics of each country. This variability allows us to identify and quantify the waterbed effect for the first time by looking at the impact of regulation on prices (and profits) in reforming countries compared with the general evolution of prices (and profits) in non-reforming countries.

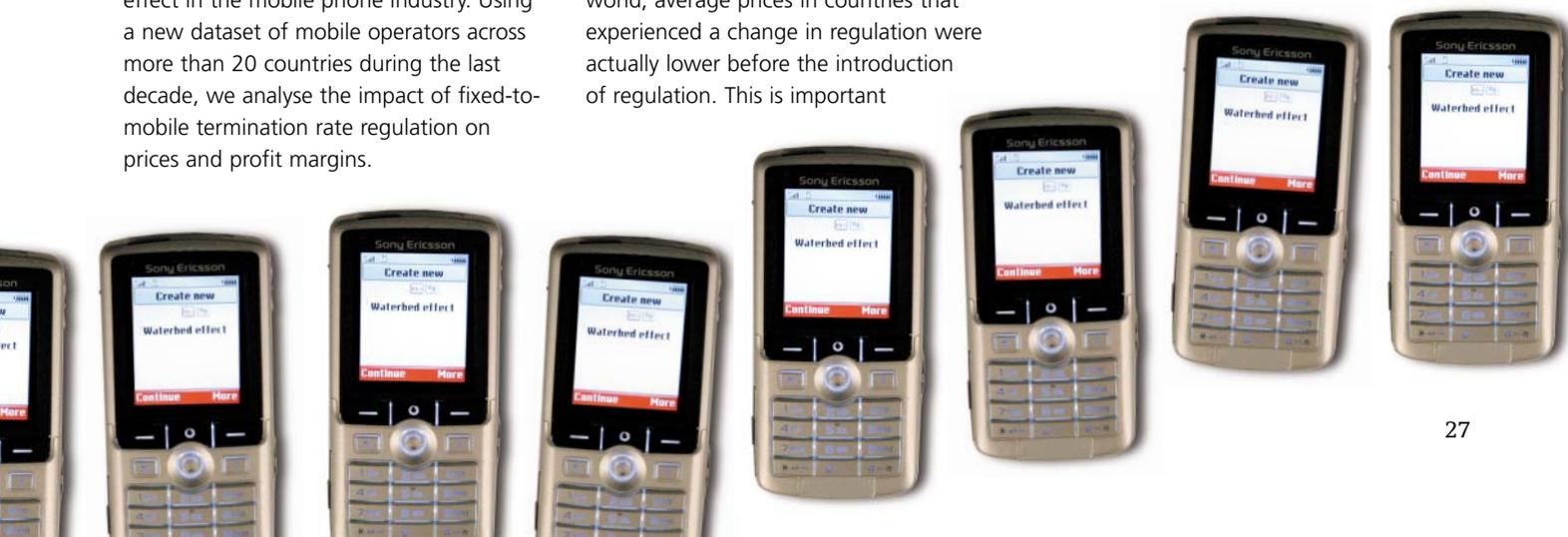
Figure 1 plots the average retail price for mobile phone usage in countries that have experienced a change in regulation, six quarters before and after the introduction of regulation. Notice first that compared with prices in the rest of the world, average prices in countries that experienced a change in regulation were actually lower before the introduction of regulation. This is important

because it refutes the argument that regulation was introduced as a result of high retail prices for making mobile calls.

Most importantly, in line with our waterbed prediction, the introduction of regulation has a clear positive impact on prices that becomes stronger as regulation becomes progressively more binding.

The full empirical analysis allows us to control both for common global trends and for any country and operator characteristics that remain constant over time and may influence both regulation and prices. Our estimates suggest that although regulation reduced termination rates by about 10%, this also led to a more than 10% increase in mobile outgoing prices on average.

But although the waterbed effect is



large, our analysis also provides evidence that it is not complete: accounting measures of profits are positively related to termination rates, thus mobile firms suffer from cuts in those rates as they possess some degree of market power.

## Conclusions

The existence and magnitude of the waterbed effect following the regulation of termination rates is key to understanding the social costs and benefits of the regulation. Regulators have generally accepted that the waterbed effect is likely under perfect competition, but they had doubts about its validity and empirical significance under conditions of imperfect competition. Our research shows that the waterbed effect exists under a wider range of possible conditions and is both significant and strong in practice.

These results have important implications for the mobile industry, but also for other 'two-sided' markets – industries like shopping malls, credit cards and dating agencies, where firms need to attract two (or more) groups of customers if they are to succeed.

- First, it implies that any analysis of the costs and benefits of regulation of termination rates cannot ignore the presence of the waterbed effect. The impact of regulation on (unregulated) prices for mobile subscribers should be taken into account when assessing the overall costs and benefits of regulation.
- Second, the mobile phone industry exhibits features typical of two-sided markets. The market for subscription and outgoing services is closely interlinked to the market for termination of incoming calls. As in any other two-sided market the structure of prices (who pays for what) is fundamentally important for the development of the

market. Therefore, any regulatory analysis must take these linkages into account either at the stage of market definition or market analysis.

- Finally, our analysis has implications for the current debate about regulation of international 'roaming charges' – the prices customers pay when using their phones outside their home country.

The European Commission has voted to cap roaming charges for making and receiving phone calls within the EU. These charges account for 5-10% of operators' revenues globally and a larger proportion of their profits. The aim is to reduce the cost of making mobile phone calls while abroad and hence encourage more overseas (but within EU) phone use.

A reduction in roaming charges may cause a similar waterbed phenomenon, whereby prices of domestic calls may increase as operators seek to compensate for their lost revenue elsewhere. Whereas with fixed-to-mobile termination regulation, it was fixed users that essentially subsidised mobile users, in this case, it would be the mobile subscribers themselves that would bear the burden, as calling abroad would be cheaper but calling at home could become more expensive.

While the likely magnitude of the waterbed effect caused by this new legislation is debatable, our results demonstrate that regulators have to acknowledge its existence and carefully account for it in their calculations of consumer benefits.

Regulation to cap  
roaming charges  
within the  
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This article summarises 'Testing the "Waterbed" Effect in Mobile Telephony' by Christos Genakos and Tommaso Valletti, CEP Discussion Paper No. 827 (<http://cep.lse.ac.uk/pubs/download/dp0827.pdf>).

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## Further reading

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