How the government should promote high speed broadband in Britain

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Are publicly subsidised improvements in broadband infrastructure socially desirable? The answer depends on a consumer surplus exists – whether users derive a benefit from internet usage above and beyond what they pay to their internet service provider. New research by ***Gabriel Ahlfeldt*** *and colleagues infers this surplus by observing property prices in areas with high internet speeds, finding that property prices increase on average by about 3 per cent when internet speed doubles. Their results argue for rolling out fibre broadband infrastructure in urban areas and less expensive fixed and mobile technologies in rural areas.*

Across the globe, governments have started to think about how they can speed up the rollout of technologies that improve access to reliable and fast internet. As an example, the National Broadband Plan launched by the US Federal Communications Commission (FCC) aims at providing 100 million American households with access to 100 megabit per second (Mbit/s) connections by 2020. The digital agenda proposed by the European Commission suggests two particularly ambitious targets: Also by 2020, every European citizen will need access to at least 30 Mbit/s, and at least 50 per cent of European households should have Internet connections above 100 Mbit/s.

Such officially defined targets seem to suggest that if left to markets the broadband infrastructure would not be optimally developed, meaning that too many households would be left without a sufficiently fast connection. While various industry sources provide some reliable estimates about the infrastructure delivery costs, we know very little about the magnitudes of economic benefits that come with higher digital speeds. It is therefore unclear whether publicly subsidised improvements in broadband infrastructure are socially desirable, i.e. improve welfare.

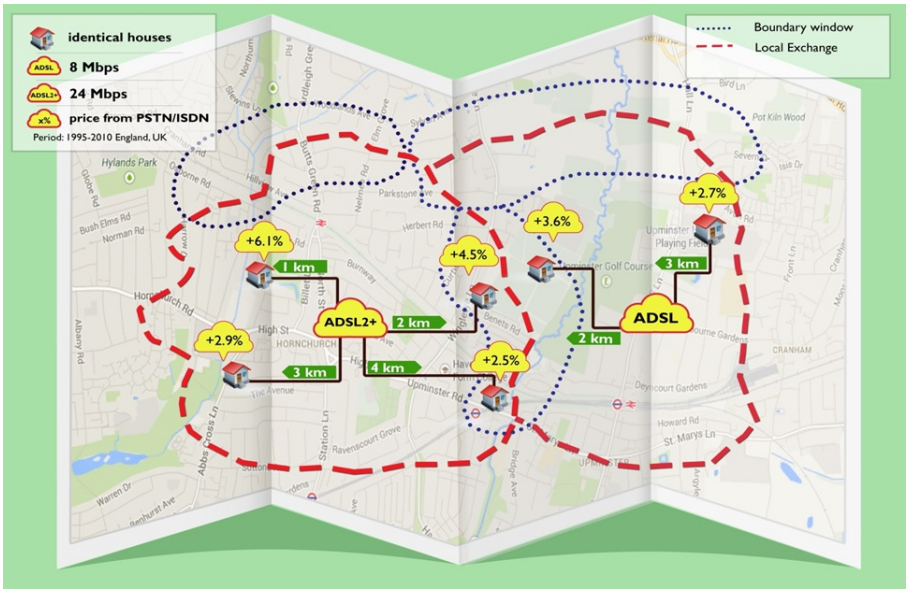
In a just released LSE SERC discussion paper my co-authors, Pantelis Koutroumpis and Tommaso Valletti, and I have tried to find an answer to this question. We were particularly interested in the benefit users derive from internet usage above and beyond what they pay to their internet service provider (ISP). We suspect that such a benefit – a consumer surplus – exists because the broadband market is very competitive and ISPs cannot price differentiate, i.e. charge higher prices to consumers with a higher willingness to pay. If such a surplus exists and is sufficiently large it can theoretically justify government action to improve broadband quality.

Measuring the surplus, however, is difficult as only the market price consumers pay for internet access is observed, but not the price a consumer would be willing to pay. We argue that it is possible to indirectly infer the consumer surplus from property prices. In the UK every property is connected to one and only one internet delivery point, the local exchange (LE). The real speed that a broadband connection offers critically depends on the distance of a property to its LE and the technology of the LE. High digital speeds can only be achieved if a property is located close to a LE and the LE has been upgraded to a fast technology. All else equal, properties at such favourable locations will be more attractive and, as a result, will sell at higher prices. The value of a decent internet connection can therefore be inferred from a comparison of property prices across locations, controlling for other factors.

Econometrically, there are two challenges with this approach. Firstly, no matter how good the data set a hand is, there will be some factors that make a property more or less attractive and are unobservable. Secondly, there may be changes to a neighbourhood such as gentrification that lead ISPs to upgrade their LEs and at the same time cause house prices to increase. Our identification strategy addresses both concerns. Our most restrictive empirical models identify the broadband premium from changes in broadband speed and house prices over time and across LE boundaries. As illustrated in Figure 1 we compare properties that are located within a couple of hundred meters, but within different LE catchment areas. Within such a small range it is unlikely that distinct changes in speed that

result from different upgrades in the two different LEs will be confounded with other changes in the neighbourhood.

Figure 1: Identification strategy and results (click image to enlarge)



Using this strategy we identify the causal effect of broadband speed on property prices from transactions that occurred in England from 1995 to 2010 and three LE upgrade waves of about close to 4000 LEs. We find that property prices increase on average by about 3 per cent when internet speed doubles. Importantly, there are diminishing returns to speed. While the increase in value is even greater when starting from slow internet connections an increase in nominal speed from 8 to 24 megabits per second raises the property value by no more than 1 per cent. Another main finding is that the consumer surplus differs substantially across regions. It is highest in high income areas that are highly urbanised. As an example, the consumer surplus in London is almost twice as high as in any other of the English regions, reflecting very high usage in the capital city for both work and personal reasons.

We use these estimates to compute the aggregate consumer surplus, which would be created by bringing all households that are currently subscribed to broadband to a 2010 target speed that in terms of the overall speed distribution corresponds to the 30 Mbit/s envisioned by the European Commission for 2020. Comparing the results to engineering cost estimates, we find that urban areas pass the cost benefit test of rolling out fibre broadband infrastructure closer to the customer premises by a large margin. The opposite is true for rural areas. This is partially because the benefits in these areas are lowest, and partially because the costs are highest.

These results suggest that in rural areas it makes more sense for governments to adopt less expensive fixed and mobile technologies that deliver decent and reliable speed. For urban areas, fibre is an economically viable technology. An equity issue arises, however, if all taxpayers pay for a subsidised rollout, but landlords in the targeted areas accumulate a large fraction of the benefits. A levy on landlords could help promoting the rollout of fibre while at the same time saving taxpayers' money and reducing inequalities.

About the Author

Dr Gabriel Ahlfeldt is Associate Professor of Urban Economics and Land Development at the LSE, having joined the Department of Geography and Environment in October 2009 as a Lecturer.