How Important are Mobile Broadband Networks for Global Economic Development?

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Mobile broadband connections have increased from approximately 27 thousand in 2001 to approximately 4.8 billion in 2017. Moreover, the use of data being sent via mobile networks has been increasing exponentially at approximately 65 percent on a year-on-year basis during the period, 2010–2015.

Previous research has shown that ICT has had a large economic impact in many countries. However, most of these studies have focused on established technologies such as fixed telephone lines and computers. Only a handful of studies have focused on mobile technologies. As more data becomes available it has become increasingly easy to also study the impact of newer technologies. This paper investigates the macroeconomic impacts of mobile broadband based on econometric methods applied to a cross-country panel data set. The primary questions that will be investigated are:

- To what extent has mobile broadband affected macroeconomic development in terms of GDP globally?
- If there is an impact from mobile broadband, is it a one-time effect of mobile broadband introduction and/or a gradual process along mobile broadband penetration?

The paper shows that mobile broadband is positively associated with GDP based on 135 countries (90 once controlling for capital, employment and human capital). Introducing a dummy variable for mobile broadband introduction in a difference-in-difference specification, there is evidence of an introductory effect from mobile broadband. Moreover, there is also a contemporaneous effect from mobile broadband penetration. Furthermore, based on moving averages, we find stronger and larger effects from five-year differences compared to first differences. This is an indication that a lagged effect from mobile broadband penetration on GDP also exists.

A major concern when interpreting the results based on pooled and fixed effect models is that of simultaneity bias i.e. mobile broadband can be considered both a driver and a result of GDP growth. We address this potential bias with an instrumental variable (IV) approach. Mobile broadband networks were constructed along the existing base stations for mobile telephony by upgrading the pre-existing cellular infrastructure. Thus, it is possible to model the maximum penetration of mobile broadband as a linear function of the diffusion of mobile phone infrastructure and personal computers before the diffusion of mobile broadband. By introducing a two stage model we are able to model mobile broadband penetration as a logistic form of S-shaped diffusion curve.

Based on a two stage model controlling for simultaneity and reverse causality, we find strong evidence that mobile broadband introduction and penetration causes GDP growth rather than vice versa. The results suggest that a 10 percent increase in mobile broadband penetration causes a 0.8 percent increase in GDP. Moreover, once we control for the years since mobile broadband was introduced, we find that the economic effect gradually decreases over time. Finally, we find that our results are robust once we distinguish between low- and high-income countries. However, the effect from mobile broadband on GDP is considerably larger and more significant in non-OECD countries compared to OECD countries.