

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 billion in 2016. 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 first uses pooled and fixed effects estimation techniques to measure the impact of mobile broadband. The results show that mobile broadband is associated with GDP. 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, though it is initially not significant once we control for capital and labor. 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 the 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 0.6–2.8 percent increase in GDP, depending on the specification of the model. Moreover, there is a significant effect from lagged mobile broadband penetration, indicating that the full effect from mobile broadband infrastructure may take time before being properly realized.