The Emergence of Broadband Internet and Consequences for Economic and Social Development

Nina Czernich
Contents
List of Tables ......................................................................................................................... ix
List of Figures ...................................................................................................................... xi
1 Introduction ......................................................................................................................... 1
2 Broadband Infrastructure and Economic Growth – International Macro-Level Evidence .. 6
  2.1 Broadband Infrastructure and Economic Growth – Related Literature ....................... 9
  2.2 Model, Data and Descriptive Evidence ........................................................................ 11
    2.2.1 A Simple Growth Regression Framework .............................................................. 11
    2.2.2 Data for OECD Countries ..................................................................................... 12
    2.2.3 The Association between Broadband Infrastructure and Economic Growth ......... 14
  2.3 The Causal Effect of Broadband Infrastructure on Economic Growth ..................... 17
    2.3.1 Instrumental Variables Derived from a Technological Diffusion Model ............... 17
    2.3.2 Instrumental-Variable Results .............................................................................. 19
    2.3.3 Tests for Instrument Validity and Robustness ....................................................... 28
  2.4 Conclusion ..................................................................................................................... 34
3 Broadband Infrastructure and Innovation – International Firm-Level Evidence ............ 35
  3.1 Networks and Collaborations as Determinants of Innovation ................................... 36
  3.2 Data Sources and Descriptive Statistics ...................................................................... 38
  3.3 Model .......................................................................................................................... 43
  3.4 The Effect of Broadband Infrastructure on Innovation ............................................. 44
  3.5 Conclusion ..................................................................................................................... 51
4 Broadband Infrastructure and Unemployment – Evidence for Germany .................... 52
  4.1 Internet and Unemployment – Related Literature ....................................................... 53
  4.2 Data, Model and Descriptive Evidence ....................................................................... 55
    4.2.1 Data Sources and Descriptive Statistics ................................................................. 55
    4.2.2 Model .................................................................................................................. 57
    4.2.3 The Association between Broadband Infrastructure and Unemployment ........... 57
  4.3 The Causal Effect of Broadband Infrastructure on Unemployment ......................... 62
    4.3.1 Identification Strategy ......................................................................................... 62
    4.3.2 Instrumental-Variable Results .............................................................................. 65
    4.3.3 Robustness Tests and Discussion ....................................................................... 68
4.4 Conclusion

5 Broadband Infrastructure and Political Participation – Evidence for Germany

5.1 Media and Political Participation – Related Literature

5.2 Model, Data and Descriptive Evidence

5.2.1 Model and Data

5.2.2 The Association between Broadband Internet and Political Participation

5.3 Instrumental-Variable Results

5.4 Robustness Tests and Discussion

5.5 Conclusion

6 Downstream Market Structure and Incentives to Invest in Broadband Infrastructure

6.1 Related Literature

6.2 Structure of the Model: The Patent Licensing Framework

6.3 Solving the Model

6.3.1 Competition in the Service Market

6.3.2 Licensing of the New Technology

6.3.3 Investment Decision

6.4 Conclusion

6.5 Appendix

7 Conclusion

References
List of Tables

Table 2.1: Descriptive Statistics ................................................................. 13
Table 2.2: Broadband Introduction and GDP per Capita .............................. 15
Table 2.3: Broadband Diffusion and Growth of GDP per Capita .................... 16
Table 2.4: The Diffusion Curve: First Stage of the Instrumental-Variable Model ................................................................. 20
Table 2.5: The Effect of Broadband Introduction on GDP per Capita: Second Stage of the Instrumental-Variable Model ................................................................. 23
Table 2.6: The Effect of Broadband Diffusion on Growth of GDP per Capita: Second Stage of the Instrumental-Variable Model ................................................................. 25
Table 2.7: The Effect of Broadband Diffusion on Growth of GDP per Capita: Instrumental-Variable Results with Fixed Effects ................................................................. 26
Table 2.8: The Effect of Broadband Diffusion on Growth of GDP per Capita: Critical Mass Specification ................................................................. 27
Table 2.9: Traditional Networks and the Diffusion of Mobile-telephony and Computers ................................................................. 29
Table 2.10: Additional Robustness Specifications ........................................ 32
Table 2.11: Measuring Broadband Penetration per Household ....................... 33
Table 3.1: Descriptive Statistics ................................................................. 39
Table 3.2: Descriptive Statistics per Country .............................................. 41
Table 3.3: Broadband and Firm-Level Innovation: OLS Results ................... 45
Table 3.4: Broadband and Firm-Level Innovation: Instrumental-Variable Results ................................................................. 46
Table 3.5: Broadband and Firm-Level Innovation Including Firm Size: Instrumental-Variable Results ................................................................. 49
Table 3.6: Broadband and Firm-Level Innovation Including Firm Size and Sector Interactions: Instrumental-Variable Results ................................................................. 50
Table 4.1: Descriptive Statistics ................................................................. 56
Table 4.2: DSL Availability and Unemployment Rate: OLS Results ............... 58
Table 4.3: DSL Availability and Unemployment Rate under 25 Years: OLS Results ................................................................. 61
Table 4.4: The Effect of DSL Availability on Unemployment: Instrumental-Variable Results ................................................................. 66
Table 4.5: The Effect of DSL Availability on Unemployment under 25 Years: Instrumental-Variable Results ................................................................. 67
Table 4.6: The Effect of DSL Availability on Unemployment: Instrumental-Variable Results with Additional Sample Restrictions ................................................................. 69
Table 4.7: The Effect of DSL Availability on Unemployment under 25 Years: Instrumental-Variable Results with Additional Sample Restrictions ................................................................. 70
List of Figures

Figure 2.1: Broadband Diffusion in OECD Countries: Actual and Predicted Diffusion Curves ................................................................. 21
Figure 4.1: Distribution of Main Distribution Frames ................................................................. 63
Figure 4.2: Distribution of the Distance to the Closest Main Distribution Frame .............. 64