How can you get more economic growth out of your ICT?
Take care of your digital divide

Alain BOURDEAU de FONTENAY
Columbia Institute for Tele-Information (CITI)
Fernando BELTRAN
University of Auckland

ACORN/REDECOM Conference 2009, Mexico City, 4-5 September 2009
Objective

- To formulate a general analytical framework that:
  - Contributes to a better understanding of the links with economic growth and economic efficiency
  - Facilitates the evaluation of competing proposals in the digital divide debate
  - Makes it possible to focus on the key differences between the competing proposals
  - Highlights those assumptions that need to be evaluated theoretically and/or empirically to buttress a policy proposal

- The objective is to develop an analytical framework, not to test it empirically nor to prove formally any parts of it.
Outline

- Background to the digital divide debate
- ICT and economic growth
- Poverty and inequality: is it efficient?
- Chronic poverty and inequality: what might make it sustainable?
- What to look for when formulating a pro-growth digital divide policy?
Why a digital divide policy?

- The primary rational for a digital divide policy might be:
  - Social equity
  - A vision of society (Gore 1996)
  - More efficient delivery of government services
  - Economic efficiency (Mueller 2001)

- Here, we are concerned with economic growth, hence economic efficiency
How to look at the digital divide?

A wide spectrum of concerns, e.g.,

- Technology (Goolsbee and Guryan 2006)
- What’s the fuss? It’s just another new good the market needs to take care of (Mueller 2001)
- Internet usage (DiMaggio et al. 2004; Noh and Yoo 2008)
- Economic growth (Liu & San 2006)
- Social exclusion (NTIA 1995; Jung 2008)
- Social capital (Selwyn 2002)
Origin: a vision of society

- Vice President Gore (1996)

President Clinton and I... challenged the nation to ensure that all of our teachers and students have access to modern computers and engaging educational software... We challenged the nation to make sure that our children will never be separated by a digital divide.
Definitions

Fink and Kenny (2003): “Four possible interpretations… [that] appear in the literature:

1. A gap in **access** to use of ICTs—crudely measured by the number and spread of telephones or web-enabled computers, for instance.
2. A gap in the **ability** to use ICTs—measured by the skills base and the presence of numerous complimentary assets.
3. A gap in **actual** use—the minutes of telecommunications for various purposes, the number and time online of users, the number of Internet hosts, and the level of electronic commerce.
4. A gap in the **impact** of use—measured by financial and economic returns”

#4 corresponds to a market failure, implying the potential merit for a policy intervention
Definitions

A digital divide policy has to be evaluated in terms of its specificity in time and space, e.g., Keniston and Kumar’s (2003) four divides:

1. “The first divide is… between
   - those who are rich, educated, and powerful, and
   - those who are not…

2. A second digital divide… is linguistic and cultural… It separates those who speak English…

3. The third digital divide… is the gap between the rich and the poor nations…

4. … in countries like India and America, yet a fourth: the emergence of a new elite group,… the beneficiaries of the enormous successful information technology industry and the other knowledge-based sectors of the economy such as biotechnology and pharmacology….”
Definitions

- DiMaggio et al. (2004) “inequalities in
  - access to the Internet,
  - extent of use,
  - knowledge of search strategies,
  - quality of technical connections and social support,
  - ability to evaluate the quality of information, and
  - diversity of uses”

- Identify useful parameters to assess ICT’s effectiveness
What are their relevance?

- Mueller (2001) – Is broadband access a consumption good or an infrastructure?
- What is the scope of the digital divide, e.g.,
  - A technology?
  - Are dimensions such as “social exclusion” relevant to economic efficiency?
  - Is DiMaggio et al.’s (2004) definition too broad/narrow to look at economic efficiency?
- What is the relevant time dimension from a policy perspective?
- To what extent might dimensions such as political power, culture, institutions, and local specificity be relevant?
Objective for a digital divide policy

2 different kinds of objectives:
- Economic efficiency
- Social equity

Implications of economic efficiency
- Proper allocation of resources
- Economic growth
- International competitiveness
Lesson for the digital divide

Would we have reasons to expect the digital divide to have a significant impact on economic growth if so many questions are raised about ICT’s own impact on the economy, especially post-2000?

Different:

- Productivity studies
  - Structural changes are ignored
  - Growth from technical change or factor substitution (Jorgenson & Vu 2005)
- Digital divide: is it long run, e.g.,
  - Is it an infrastructure?
  - Is it associated with institutional changes?
Productivity analysis

- Generic formulation:
  \[ Q = A_F F\{L, K\} \]
  where \( L \) and \( K \) are constant quality but the index methodology used to estimate \( L \) and \( K \) implies that:
  \[ L = A_L N \]
  \[ K = A_K C \]
  \( N \) and \( C \) are the observed labor and capital inputs and \( A_L \) and \( A_K \) are the measured of technical change for those inputs.

- Productivity studies ignore factor-specific technical change \( A_L \) and \( A_K \).
The digital divide & growth: the impact of poverty

- $A_F$ is Solow’s technical change
- $A_L$ is the labor-specific technical change

Unskilled labor is primarily associated with poverty, hence, potentially with the digital divide. The digital divide, if it exists would correspond to frictions in the labor market associated with poverty.

- Growth might be achieved through improvements in:
  - Low skilled labor participation, $N_{USkilled}$
  - Ability to benefit from technical change, $A_{USkilled}$
Poverty/inequality

Question – What determines what?

Direct – what direction?
- Poverty/inequality $\Rightarrow$ Growth
- Poverty/inequality $\leq$ Growth
- Poverty/inequality $\Leftrightarrow$ Growth

Indirect:
- Poverty = $F(\text{other factors} = X)$
- Growth = $G(\text{other factors} = Y)$
- How are $X$ and $Y$ related and how does it affect the relationship between poverty/inequality and growth?

(Davis 2006)
Poverty

- **Question: poverty/inequality?**
  - Absolute poverty: trickle down effect
  - Relative poverty
  - Subjective poverty
  - Inequality

- **Absolute poverty**
  - Long run: growth is good
  - Short run: ambiguous
  - Ambiguous:
    - Mostly absolute only in the short run (periodically revised)
    - But subcategories such as food insecurity (Gundersen 2008)

- **Inequality**
  - More flexible than relative poverty
  - Reflects better the behavioral impact of the evenness and fairness of the income/wealth distribution
Multidimensionality of poverty

- Poverty is multidimensional, e.g.,
  - Food insecurity (Gundersen 2008)
  - Violence and security (Fay 2005; Aizer 2008)
  - Socio-economic polarization (Mogues & Carter 2005)
  - Racism (Becker 1957)
  - Political power (Chin & Wagner 2007)
  - Business cycles
Relative poverty, inequality, and growth?

- Observation: inequality
  - Decreased in the middle of XXth century
  - Generally increased since the ‘70s
- Increased inequality:
  - Generally attributed to technological change, but why long run?
  - Some suggest ICT is a GPT
    - Very long time impact on labor force
    - Skilled labor force is a complement
    - Unskilled labor force a substitute
    - Limited wage flexibility of low wage worker
  - Potentially: low skilled workers might become permanently unemployable
No inequality in a pure neoclassical environment

- Neoclassical labor allocation:
  - Individuals differ in terms of their innate abilities
  - Abilities are randomly distributed among individuals
  - The demand for abilities is exogenous and may change at random
  - The economy is characterized by perfect competition
    Then, marginal product-based wages are efficient

- Neoclassical credit market:
  - People can “insure” themselves against low-wage abilities

(Aghion and Howitt 1998)
Corrective factors

- Competition optimizes efficiency given the transfer requirements (Becker 1957)
- Knightian uncertainty (Knight 1921)
- Innovation (Schumpeter 1912)
- The response by the poor/minority:
  - Threat (Margo 1991)
  - Assimilation (Bloch & Rao 2001)
- Pressure toward power sharing (Alesina & LaFerrara 2005)
- ...

Alain BOURDEAU de FONTENAY (ad2239@columbia.edu)
Fernando BELTRAN (f.beltran@auckland.ac.nz)
The impossibility of an efficient market-based allocation system

- Perfect credit market are inconsistent with free riding
- Cost of credit is inversely related to wages
  - It is expensive to be poor
- The very poor cannot be accountable, i.e., the cost of credit is infinite for them
- The very poor need a welfare transfer to compensate for very low marginal product (safety net)
- Excluding lumps sum transfer, the need for transfer
  - distorts the allocation of labor, hence
  - introduces economic inefficiency

(Duflo 2003)
Why inequality is inefficient?

- Poverty is undesirable, hence the haves have
  - The incentives to restrict upward mobility-based competition by the higher abilities have-nots.
  - More resources to block competition due to their higher wages, e.g., through being in a better position to:
    - Manage information
    - Manage the political process (Buchanan)
    - Control the allocation of public resources (e.g., education, security)
  - Hence, a greater ability to achieve mobility foreclosure (Chin & Wagner 2007; Cuellar 2007)
- Mobility limitations means tendencies toward increases in chronic poverty
Population segmentation and mobility

- Mobility foreclosure (hence inequality) strengthened where:
  - Individuals are easily identifiable (Alesina et al. 1999)
  - Easy identification facilitates discrimination (Phelps 1972)
  - Discrimination controls mobility

- Disproportionate representation among the poor
  - Many racial and ethnic minorities (Kijima 2006)
  - Women
Population segmentation and mobility

- Hence, easy identification facilitates mobility foreclosure through discrimination
  - For instance, Eliza in Shaw’s 1913 Pygmalion (My Fair Lady)
  - Easier identification facilitates mobility foreclosure (Quillian 2003)

- Discrimination is self-enforcing
  - Statistical discrimination (Phelps 1972; Altonji and Pierret 2001)
  - Implicit discrimination (Bertrand et al. 2005)
  - Network effects (Lee 2004)
Population segmentation and the allocation of political power

- Geographic segmentation and discrimination (Squires and Kubrin 2005)
- Enforcement of laws and regulation (Cuellar 2007)
- Information about minorities (Galbraith et al. 2006)
- U.S. welfare reform (Jennings 2001)
Summary

- The concern with the digital divide is about poverty and inequality
- Poverty and inequality
  - Time dimension:
    - Chronic (segmentation, lack of mobility)
    - Response to short run fluctuations
  - Information/discrimination key to mobility
- What might make it sustainable?
  - Information/discrimination
- Reducing chronic poverty and inequality contributes to economic growth
- Hence ICT needs to reduce discrimination
Potential

- Using ICT as:
  - Affirmative action (Franke 2007)
  - A way to better implement legislations and regulations, e.g.,
    - Gender-based (Gayathri 2005)
  - ...

- Challenge - How to formulate a pro-long run growth strategy to go from the digital divide to the promotion of digital opportunity?
  - Inequality is largely sustained through social discrimination buttressed by institutions, what digital divide strategy can best address those problems?
  - The window of opportunity is limited in time (McSorley 2003)
Bibliography


Bibliography


THANK YOU