

Research that may be done once connectivity problems are solved

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This work was carried out with the aid of a grant from the International Development Research Centre, Canada and the Department for International Development UK



AGRICULTURE

Unhappy are we in developing world whose lives touch agriculture

- In most of our countries, proportion of population in agriculture > agriculture as proportion of GDP
 - Evidence of low-productivity
 - If we go down to sub-national units such as districts, problem could be worse
- Farmers are poor and have to bear high levels of risk (climate change, weather, pests, market, etc.) → unhappy
 - Their children want to leave agriculture and rural areas
- Domestic consumers are also unhappy at high prices and low quality

Two key problems

- How can we help farmers and first handlers manage risks better and thus become more productive?
- How can we create alternative employment for the children of farmers who want to leave agriculture (and who cannot be absorbed by agriculture as it becomes more productive)?

Risks and ICTs

- Risks are inherently about problems of information (Arrow) → ICTs can play a role helping manage risks
 - However, we should not imagine that ICTs by themselves can be the solution

Literature & systematic reviews exist

THE
QUARTERLY JOURNAL
OF ECONOMIC

Vol. CXXII August 2007

Does ICT Benefit the
Evidence from South

Stefan Klöpper, Cornell University and J. W. C.

American Economic Journal: Applied Economics 2 (July 2010) 46-59
<http://www.aeaweb.org/journal.php?doi=10.1257/app.2.1.46>

Information from Markets Near and Far:
Mobile Phones and Agricultural Markets in Niger

Dr. Jacques C. Auzan

THE DIGITAL MARKET

When is arbitrage? E allocated off performance was introduced Using micro fishermen a dispersion, 1 Law of One

How to manage an information example, First Fundamental Equilibrium (LOP) (Le

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POLICY RESEARCH WORKING PAPER 4996

IMPACT EVALUATION SERIES No. 33

The Power of Information

The Impact of Mobile Phones on Farmers' Welfare in the Philippines

Jules Lobone
Robert S. Chase

Is IT Enough? Evidence from a Natural Experiment in India's Agriculture Markets

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Access to information and communication technologies (ICTs) such as mobile phone networks is widely known to improve market efficiency. In this paper, we examine whether access to timely and accurate information provided through ICT applications has any additional impact. Using a detailed dataset from Remote Market Light (RML), a text message service in India that provides daily price information to farmers, we find that this information reduces geographic price dispersion of crops in rural communities by as much as 5.2% (and, since 2005, p-value 4.3%) over and above access to mobile phone technology and other means of communication. To identify the effect of information on price dispersion we exploit a natural experiment where bulk text messages were banned unexpectedly across India for twelve days in 2010. We find that access to RML information has the largest impact in areas where RML has the largest number of subscribers. Also, the effect is largest for perishable crops. RML thus reduces the higher risk associated with high value perishable crops. We discuss implications for development organizations and for information providers.

Key words: price dispersion, information and communication technology, natural experiment, supply chains

1. Introduction

The rapid and widespread growth of information and communication infrastructures such as mobile phone networks in Africa and Asia has created a number of opportunities for economic growth

developing countries, per provides information across the phone service cost reduction in market pairs with

Information flows in Nigeria, Niger

market agents have realized that this information is flexible or asymmetric. Due to markets is a common (Austan Goolbsbee 2002; mason 2007). In this case important implications nascent markets.

Information in context

- Different risks affect different phases of agriculture which have different information requirements, e.g., at time of planting, farmers want information very different from what they need at harvest time
 - Face risk of glut when crop comes to market (harvest)
 - Market prices plus forward prices are the solution
 - Forward contracts and futures markets require information on many things to work → ICTs
 - Face risk of diseased or low-quality seed material (planting)
 - Reputation systems
 - Insurance

LIRNEasia research as examples

- Market prices:
 - How best to collect?
 - How best to disseminate?
 - Connection to storage & warehouse receipts
 - Forward and futures markets
- Reputation systems
 - Will they work when market is monopolized?
- Information when they need it, where they need it

Alternatives to farming

- Surveys to find out what young people want
 - Propensity score matching
- How can we take urban facilities and opportunities closer to rural areas?
- ICTs transcend time and space, making possible
 - In-shoring of back office work
- New urban settlements
 - Big data can help

BIG DATA

Big data

- Massive volumes of data with variety that cannot be handled by conventional hardware and software, e.g.,
 - Mobile network big data
 - Electricity billing data
 - CCTV and satellite images
- When used for public purposes, must always think about representivity
 - Traffic speeds can be measured without all vehicles having sensors
 - But for many things, close to full coverage matters

Few can do data analytics

- In our countries, most datafied data are in the hands of private companies, who are unlikely to give them to anyone who asks
- Even if they did, few would have the capability to analyze
 - Data analytics is hot; huge demand in private sector
- Hardware and software not a major barrier for those with knowledge
 - Our stack cost USD 30k
 - Software is open source

Marginalization can be studied

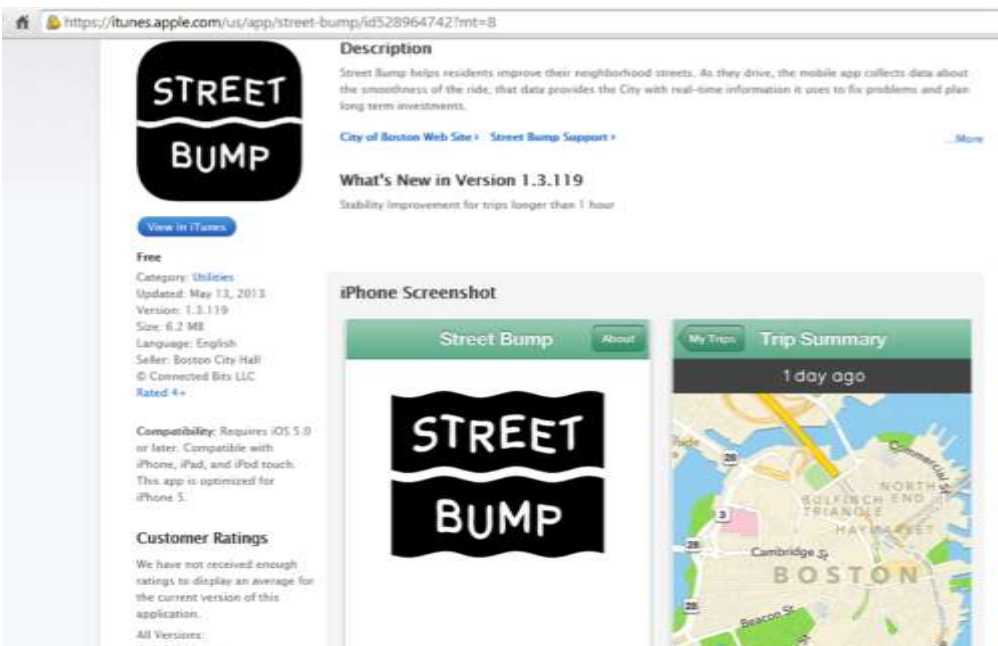
- “What gets counted gets done”
- Importance of being visible in aftermath of natural disasters
- Look at who is being included in data analytics and who is not and what consequences result

Opposite of marginalization is privacy

- Much is said about privacy, starting from abstract principles
- Is it possible to systematically study:
 - What people actually do in everyday life regarding personally identifiable information (PII)?
 - What are the “privacy-related” harms that are litigated (Solove’s approach of using case law as a research tool)
 - What are the “privacy-related” harms that make it to the media?

Bias in big data → why mobile network big data in developing countries

- Streetbump is a Boston crowdsourcing + big data application that uses the natural movement of citizens to improve street maintenance
 - Data generated from an app downloaded to a smartphone “mounted” in a car
- Can Streetbump be transplanted in Colombo at this time?
 - Feature phones >> Smartphones
- “Something better than nothing” may not apply
 - Bias toward roads traversed by smartphone owners → In conditions of limited resources, may skew resource allocation



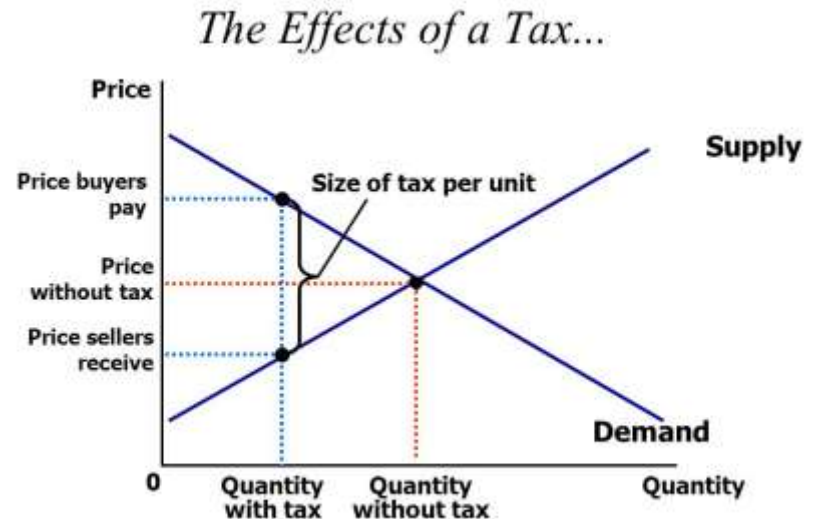
Competition

- How are enterprises affected by access to data about their customers?
- Do the prospects of companies change because of access to data?

TAXATION

More and more is being taken out of ICT sector by government

- Uniform taxation should be applied to all goods and services, additional sector-specific taxes distort demand
- But governments follow Willie Sutton doctrine: “I rob banks because that’s where the money is”
 - Some go direct to Treasury
 - Others are said to be for universal service, but are not spent
- Money that has been withdrawn from a reasonably competitive sector must be disbursed
 - Otherwise, it’s only doing harm by depressing demand

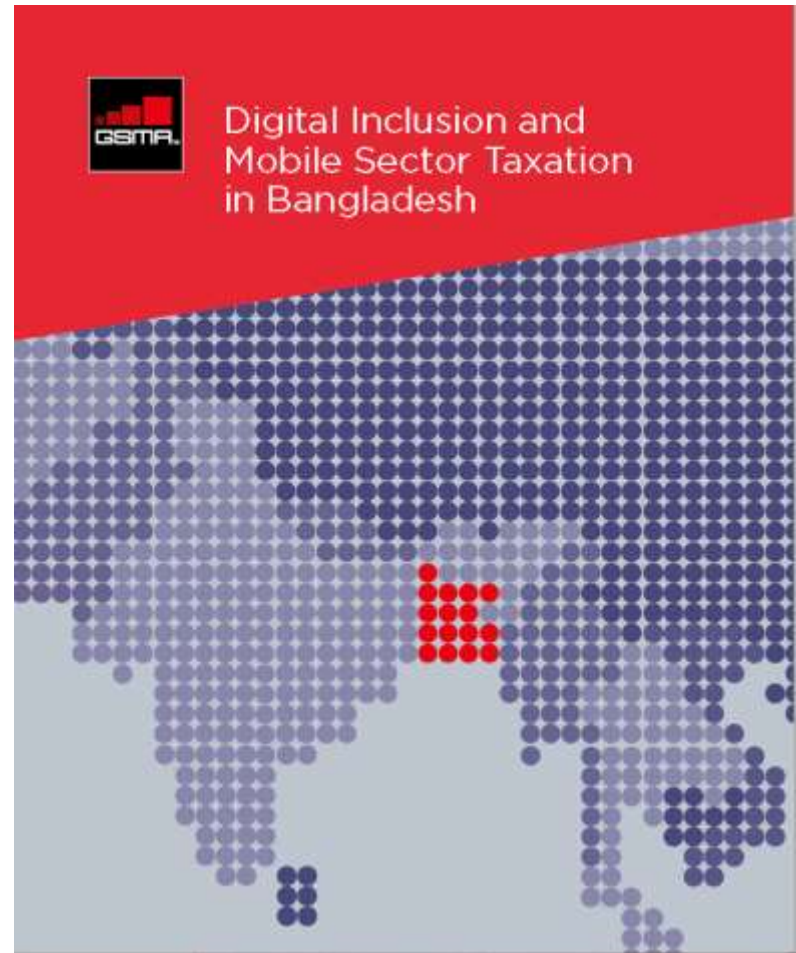


What is being done with the extracted money in form of special or sector-specific taxes?

- Regulatory fees can be justified, as long they are applied uniformly across regulated entities
 - But are they being used for stated purposes?
 - Sometimes, controls are lax in “independent” regulatory agencies; citizen oversight can be useful
- Universal service levies offer many opportunities for policy-relevant research
- Other mobile/data specific taxes

Much more can be done with tax effects

- Companies like Deloittes have comprehensive tax databases



Open models are needed . . .

- Consulting firms have also developed models to estimate effects, but “black box” models are not appreciated in academia

Potential impact of tax reform, 2020



Source: Deloitte analysis based on operator, GSMA, IMF and World Bank data

International platforms and taxation

- Legacy businesses such as hotels & retailers are crying foul because their platform competitors don't have to pay tourist/other taxes
- Debates are not based on evidence, but on claims of fairness and appeals to nationalism

Wants such businesses to repatriate earnings from Sri Lanka back to locally-based bank accounts



By Chandeepa Wettasinghe

Sri Lankan government, largely influenced by legacy businesses, is likely to bring in new legislation to regulate e-commerce businesses operating in the country, which have disrupted traditional business models.

"They (e-commerce operators) are just operating here. Where is the regulation for that? We will make them bring money earned here back to the country," Finance Minister Ravi Karunanayake told Mirror Business on the sidelines of the 9th Ease of Doing Business Forum organized by the Finance Ministry.

Interestingly, Minister Karunanayake wants e-commerce businesses to repatriate earnings from Sri Lanka back to locally-based bank accounts in the backdrop where Sri Lanka is trying to introduce more liberalized foreign exchange laws, repealing the current Exchange Control Act. The move could be a big blow, specially to budget tourism operators as well as budget tourists coming to Sri Lanka, as Karunanayake said that the Tourist Hotels Association of Sri Lanka (THASL)—which represents larger hotels—had been in touch with the government requesting such regulations.

Creative solutions needed

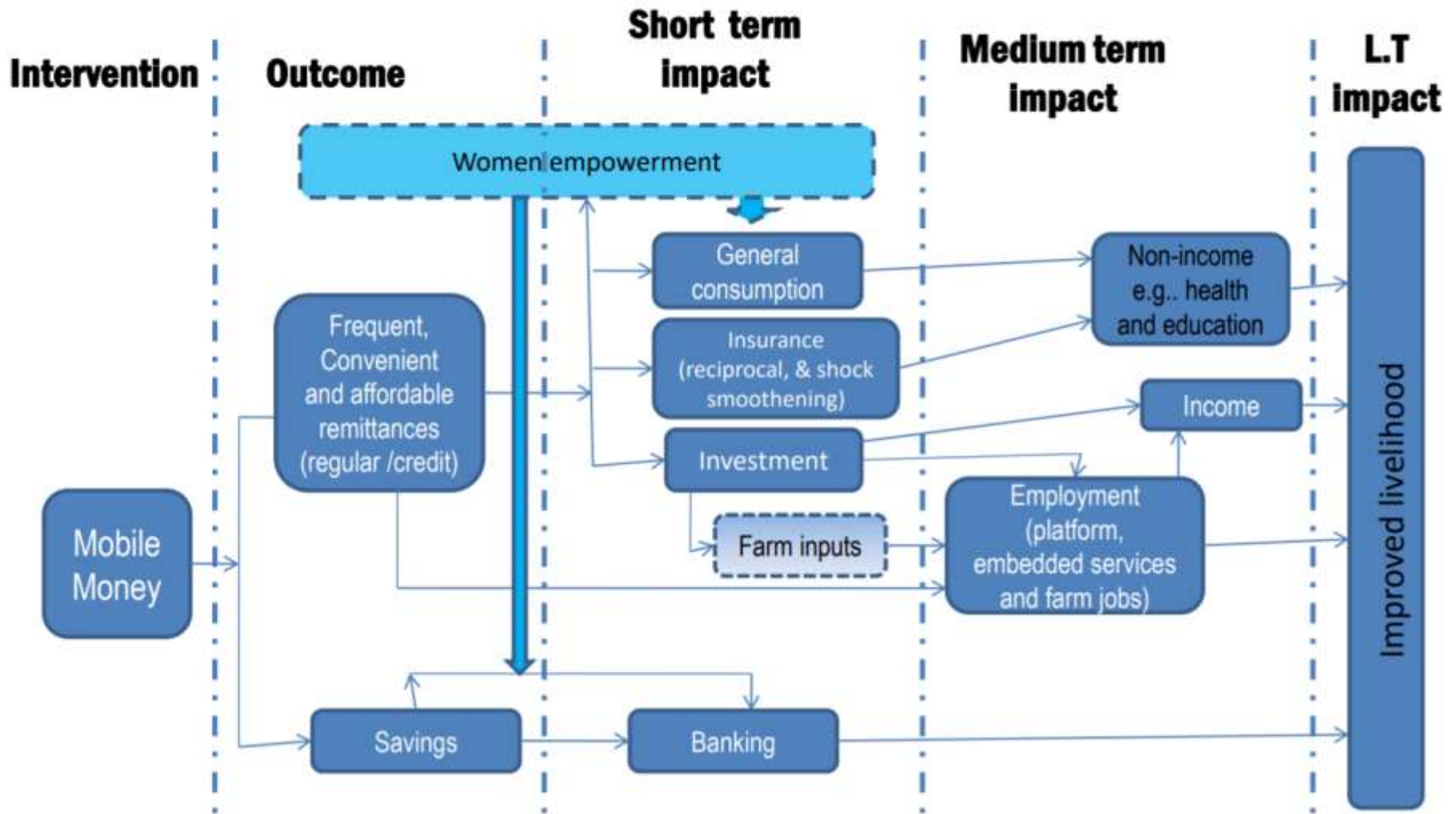
- Governments need money, but platforms are inherently international
- Buyers cannot be compelled to subscribe to multiple payment platforms
 - Transaction costs
 - People will avoid taxes if they can

MOBILE FINANCIAL SERVICES

MFS succeeded wildly in E Africa, but not everywhere

- Why?
- General hypothesis is that it has to do with the alternatives
- But lots of effects questions remain

Theory of Change



Impact on remittances:

Frequency

- In Kenya:
 - Increased likelihood of receiving and sending remittances by 37.4% and 34.3% (Jack & Suri, 2013)
 - MPESA adoption and frequency of sending/receiving transfers positively correlated; sending transfers statistically significant. Mbiti & Weil (2011:16)
- In Uganda:
 - 56% difference between users and non-users in frequency of remittances received (Munyegera et al. 2014).
- In Niger:
 - Frequency and amount of remittances by people with mobile phones with Zap were higher than those without the service (but not significant) Aker, et al. (2012)

SMOOTHENS FINANCIAL FLOWS
MORE RECIPROCITY IN SHORT TERM

Impact on remittances: Volume

- In Kenya:
 - 33.1 and 32.6 KES higher amounts of remittance sent and received by households with MPESA in ($p < 0.01$ for both) (Jack & Suri, 2013).
 - Rural user households received KES 12,697 more than non user HH's (equivalent to 66%, $p < 0.05$) (Kikulwe, et al. 2014)
- In Uganda:
 - 43% higher total value of remittance received ($p < 0.01$) (Munyegera & Matsumoto, 2014)
- In Rwanda:
 - Airtime transfers increased during shocks (Blumenstock, et al. 2011)

Impact on savings

- In Kenya:
 - Positive association between MPESA adoption, bank use and savings and employment (Mbiti and Weil, 2011:16)
 - Reduces informal savings (-38.3%, $p < 0.05$), practice of hiding money for saving (-77.2%, $p < 0.01$); Also translates into a positive increase in formal saving (+27.3%, $p < 0.01$)
 - Amount of monthly savings increases (OLS: +11.8%, $p < 0.05$), IV: +31%, NS) (Demombynes and Thegaya, 2012)
- In Mozambique:
 - General saving (+4.3%, NS); mKesh saving (+24.9%, $p < 0.01$)
- In Afghanistan:
 - Users more likely to save on MPaisa, but total savings did not significantly differ from non-users (Blumenstock, et al. 2015)

Above were just some examples

- You can see more from the theory of change diagram
- Even if it looks like an answer has been found for another country, the enabling conditions in your country/area may be different

How one can leverage systematic reviews

- Search for systematic reviews on any subject that interest you
- In many cases you will find gaps remain
- Even if it looks like effects have been established, causal mechanisms require enabling conditions to yield effects

EXAMPLE OF EFFECTS: MOBILES AND RURAL LIVELIHOODS

About the review

- What did we study?
 - Mobile phone interventions for improving **economic and productive outcomes** in **rural areas** in low and middle-income countries (LMICs)
- Economic and productive outcomes = changes in:
 - Individual income/savings/wages/expenditure
 - Household income/savings/expenditure
 - Business profit/productivity
 - Wastage
 - Market price dispersion or volatility

What did we do?

The image shows a collage of web pages. At the top left is the World Bank logo with the text "THE WORLD BANK IBRD • IDA Working for a World Free of Poverty" and a language selector set to "English". Below this is a navigation menu with "Home", "About", "Data", "Research", "Learning", "News", and "Projects & Operations". A red banner below the menu reads "Research & Outlook". To the right is the American Economic Association logo with a search bar containing "Journal Articles" and a "GO" button. Below these are the SSRN (Social Science Research Network) logo and navigation menu. The SSRN page includes a "MEMBER SIGN IN" section with fields for "USER ID" and "PASSWORD", and a "RESEARCH NETWORKS:" list with categories like Accounting (ARN), Anthropology & Archaeology (AARN), Cognitive Science (CSN), Corporate Governance (CGN), Economics (ERN), Entrepreneurship (ERP), Finance (FEN), and Health Economics (HEN). The SSRN page also features a "Enter SSRN eLibrary" section with logos for Chicago Booth, Korea University, and Stanford Law School, and a "Search" section with "Top Papers", "Top Authors", and "Top Organizations" filters. On the right side of the collage is the Google Scholar logo and a search bar with a magnifying glass icon. Below the search bar are radio buttons for "Articles (include patents)" and "Case law", and promotional text: "New! 2014 Scholar Metrics released" and "Stand on the shoulders of giants".

What did we do?



Studies screened: 9,082

Excluded after detailed abstract and full text review: 9,032

Qualitative, not mobile, urban, impact not measured, theoretical, descriptive stats

Critically Appraised: 48

Included: 14

What did we find?

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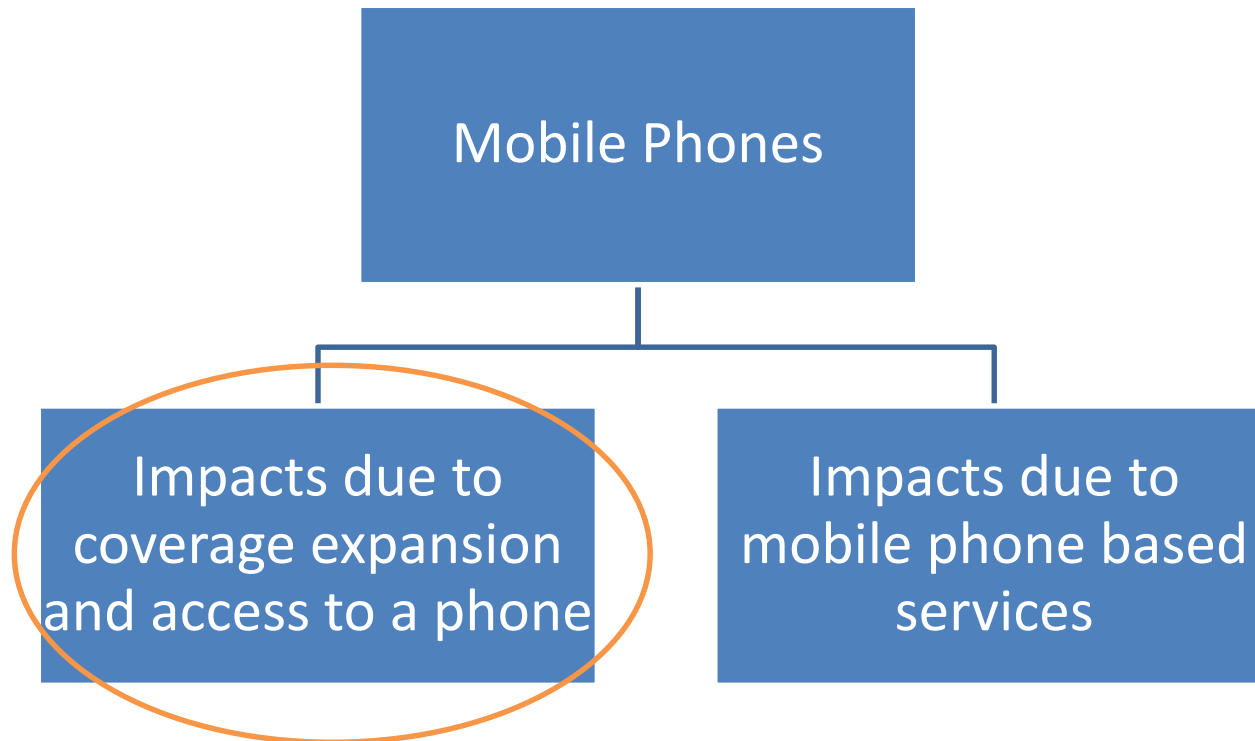
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About the studies

Author	Observations	Occupations	Duration	Location
Jensen (2007)	74,700	Fishers, traders	1997-2001	Kerala, India
Aker (2010)	53,820	Traders	1999-2006	Niger
Aker and Fafchamps (2011)	39,120	Traders, farmers	1999-2008	Niger
	2,503			
Labonne and Chase (2009)	2,092	Farmers	2003-2006	Philippines
Beuermann et al. (2012)	40,000	Cross-sectoral	2001-2007	Peru
Klonner and Nolen (2008)	57,486	Cross-sectoral	1996-2001	South Africa

Findings

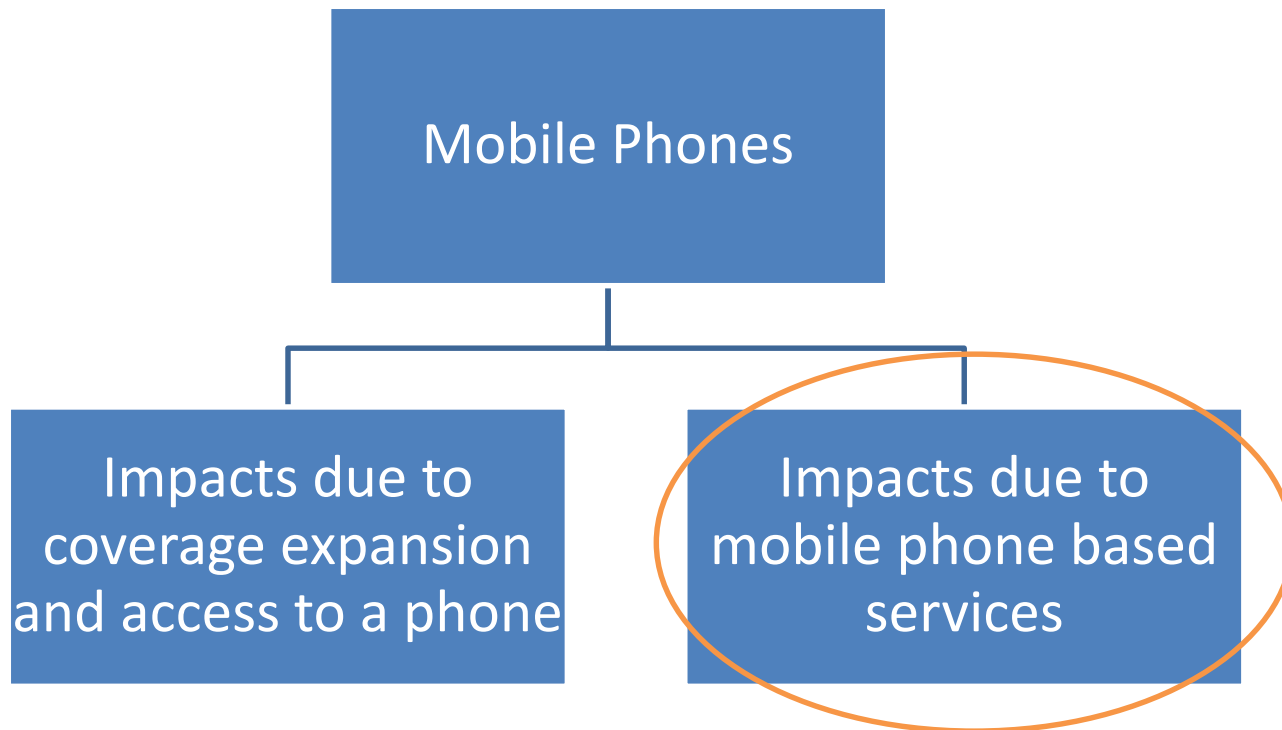
Author	Findings
Jensen (2007)	INR 5 reduction in Max-Min spread of prices between market
	fishermen's profits increased on average by 8%
	consumer price reduced by 4%
Aker (2010)	5-8% waste reduced to almost 0
Aker and Fafchamps (2011)	10%-16% reduction in grain price dispersion. The effect is stronger for market pairs with higher transport costs
	50% reduction in the Max-Min price spread of farm-gate prices within a region
Labonne and Chase (2009)	reduces producer price dispersion for cowpeas by 6%. No higher producer prices but lower intra-annual price risk for farmers.
	increase in growth rate of per capita consumption: 15% (excluding communication)

Findings

Author	Findings
Klonner and Nolen (2008)	Employment increases by 15 % when a locality receives complete network coverage (increased employment by women).
Beuermann et al. (2012)	Wage income increases by 15% after 2 years coverage, 34% after 6 years of coverage. Value of household assets increases by 23% 2 years after coverage, and increases to 54% after 6 years of coverage.

Mobile network expansion has impact

- Causal mechanism
 - Improves coordination between buyers and sellers in hitherto separate agricultural markets, in effect merging them into a bigger market
 - Reduces price dispersion (Law of One Price) and aligns supply and demand (Say's Law)
 - Has similar effect on labor markets
 - Indirect effects too
 - In South Africa mobile coverage increased likelihood of someone being employed by 33.7%
 - Economic improvements were reflected in rising disposable income, household assets and thus expenditure (easier to measure)
 - Expenditure increased by 44.6%, six years after coverage arrived in Peru
 - Resulted in increased growth of consumption (about 15%) among farmers in Philippines, excluding communication-related consumption
- But enabling conditions (which vary even within countries) must exist, e.g.,
 - Even if price/demand information available from new location through mobile communication, it must be possible for the supplier/trader to take commodity to that place: physical transport
 - The institutional conditions must permit the action. If the fisher/trader is not empowered to sell in new location by owner of boat/grain, information by itself will not improve outcomes



About the studies

Author	Service Offered	Sample/obs	Duration	Location
Fafchamps and Minten (2011)	Price, weather and crop advisory information via SMS	1,000	12 months	Maharashtra, India
Parker et al. (2012)	Price information via SMS	14,349	12 months (12 days)	India
Camacho and Conover (2011)	Price and weather information via SMS	1,107	26 weeks	Colombia

Findings

Author	Findings	
Fafchamps & Minten (2011)	price dispersion	Not generalizable
	price received by farmers	Not generalizable
	crop loss	Not generalizable
	likelihood of changing crop varieties and cultivation practices	Not generalizable
Parker et al. (2012)	Price dispersion for crops for each state	5.2% higher spatial price dispersion during a bulk SMS ban
Camacho & Conover (2011)	sale price	Not generalizable
	farmers' revenues	Not generalizable
	household expenditures	Not generalizable
	crop loss	Not generalizable

Reasons for impact (or inability to find impact)

- Too short a time to find effects
- Problems with targeting
 - Did the intended beneficiaries get the relevant information at the relevant time?
- Language issues
- Literacy issues – especially with SMS
- Push versus pull service
- Experience in using the service

Causal mechanism & enabling conditions

- Causal mechanism same as with network extension (difference being proactive supply of information)
 - Hitherto separate markets consolidated through ICTs
- Information services reduced price dispersion but the desired impacts were not seen
- Same qualifications re enabling conditions