Columbia Business School

The impact of South Africa Connect on jobs and the economy

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South Africa Connect aims to ensure that 50% of the population has access to at least 100 Mbps by 2020, reaching 80% by 2030

Current Situation

	2012	Source
Fixed Broadband Network Coverage (population)	75.00%	DOC
Fixed Broadband Penetration (population)	2.18 %	ITU
Mobile Network Coverage (population)	99.79 %	ITU
Mobile Broadband Network Coverage (population)	83 %	GSMA (*)
Mobile Broadband Penetration (population)	23.76 %	GSMA

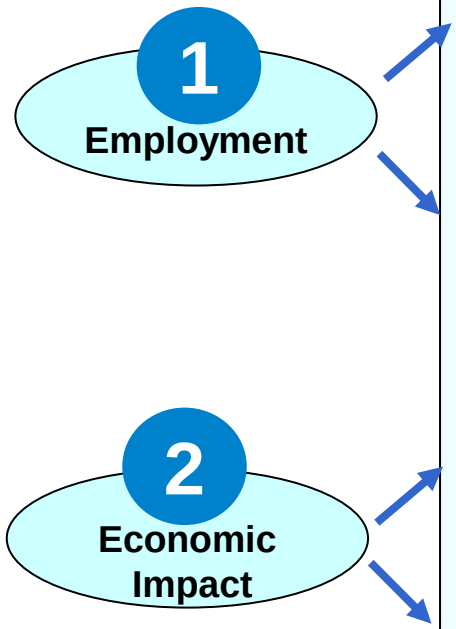
(*) 3 G Coverage: Vodacom (83%), MTN (65%), Cell C (80%), Telkom (60%)

Targets: Broadband Network Coverage (households)

Speeds (User experience)	2015	2020	2030
5 Mbps	50 %	100 %	
10 Mbps	- - -	- - -	100 %
100 Mbps	- - -	50 %	80 %

Source: South Africa Connect

The purpose of this presentation is to assess the impact of this policy on South African employment and the economy



- **How many jobs** will South Africa Connect be capable of generating as a result of network deployment?
- How large will the **employment creation effect** be once the National Broadband Network is deployed?
- What will the impact be in terms of **domestic value added resulting from network construction**?
- What is the **incremental GDP growth** that can be linked to broadband deployment?

The analysis comprises two analytic techniques, supported by input-output analysis and econometric models

A

IMPACT OF BROADBAND CONSTRUCTION

Format the I/O table

- Summation of all intermediate products and taxes
- Creation of identity matrix
- Calculate the Leontief inverse

Calculate multipliers

- Correct for value added intensity to calculate value added multipliers
- Use productivities to calculate employment multipliers

Calculate Impact of Investment

- Use investment as input and calculate GDP end employment impact based on multipliers
- Use indirect and indirect multipliers to calculate induced effects

→ **Short term Keynesian effect**

B

IMPACT OF BROADBAND SPILL-OVERS

Assess historical impact based on econometric model

- Standardize cross-sectional time series
- Estimate parameters

Estimate future change in penetration and use metrics

- Broadband penetration
- Systematic change in utilization of services

Stipulate impact on employment and GDP growth

- Rely on independent variables of econometric models

→ **Medium and long term effects on the economy as a whole**

The analysis comprises two analytic techniques, supported by input-output analysis and econometric models

A

IMPACT OF BROADBAND CONSTRUCTION

Format the I/O table	Calculate multipliers	Calculate Impact of Investment
• Summation of all intermediate products and taxes • Creation of identity matrix • Calculate the Leontief inverse	• Correct for value added intensity to calculate value added multipliers • Use productivities to calculate employment multipliers	• Use investment as input and calculate GDP end employment impact based on multipliers •Use indirect and indirect multipliers to calculate induced effects

→ **Short term Keynesian effect**

B

IMPACT OF BROADBAND EXTERNALITIES

Assess historical impact based on econometric model	Estimate future change in penetration and use metrics	Stipulate impact on employment and GDP growth
• Standardize cross-sectional time series • Estimate parameters	• Broadband penetration • Systematic change in utilization of services	• Rely on independent variables of econometric models

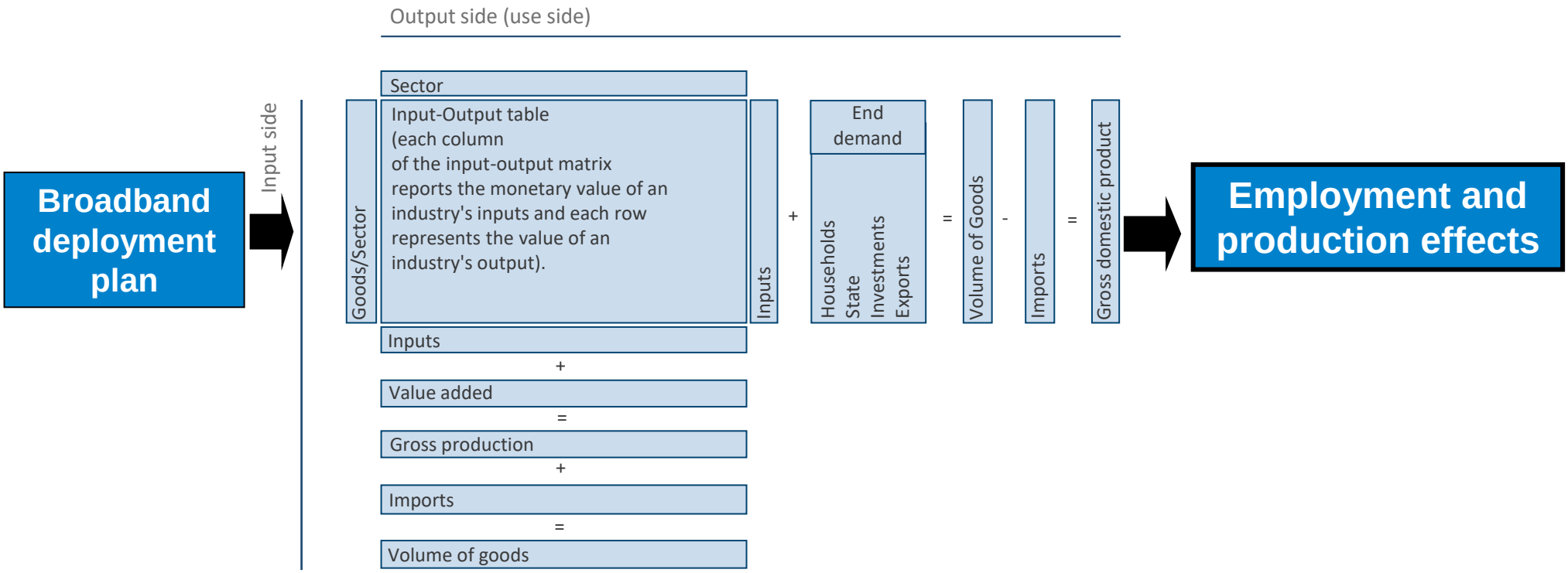
→ **Medium and long term effects on the economy as a whole**

A Three types of network construction effects exist

Direct jobs and output	• Employment and economic production generated in the short term in the course of deployment of network facilities	• **Telecommunications technicians** • **Construction workers** • **Civil and RF engineers**
Indirect jobs and output	• Employment and production generated by indirect spending (or businesses buying and selling to each other in support of direct spending)	• **Metal products workers** • **Electrical equipment workers** • **Professional Services**
Induced jobs and output	• Employment and production generated by household spending based on the income earned from the direct and indirect effects	• **Consumer durables** • **Retail trade** • **Consumer services**

A Input-output methodology was used to calculate the impact of broadband construction on employment and production

INPUT / OUTPUT METHODOLOGY



Source: Katz (2012)

A Based on the breakdown benchmarks, we allocated an estimated ZAR 65 B investment in three primary sectors of the I/O matrix

BREAKDOWN OF NBN REQUIRED INVESTMENT (CAPEX ONLY) (in ZAR '000'000)

NATIONAL BROADBAND NETWORK FUNDING (2014-18)

INPUTS	Wireline		Wireless		Total
	%	Investment (M)	%	Investment (M)	Investment (M)
Electronics	12 %	ZAR 5,640	45 %	ZAR 8,100	ZAR 13,740
Construction	67 %	ZAR 31,490	34 %	ZAR 6,120	ZAR 37,610
Telecommunications	21 %	ZAR 9,870	21 %	ZAR 3,780	ZAR 13,650
Total		ZAR 47,000		ZAR 18,000	ZAR 65,000

Source: Breakdown based on Deployment numbers for NGAN European carrier (wireline) and Wimax/3G US carrier (wireless), in Katz et al. (2010)

A Fulfilling the objectives of South Africa Connect will generate 435,000 jobs with sizable multipliers

SOUTH AFRICA CONNECT: IMPACT OF NBN ON JOBS

			INVESTMENT
Investment (Rand in millions)			**65,000**
Employment creation	Direct effect	Jobs in equipment equipment manufacturing, construction and telecoms	227,024
	Indirect effect	Jobs in other sectors	102,161
	Induced effect	Household spending induced from direct/indirect effects	106,701
	Total effect	**Jobs in all sectors**	**435,886**
Multipliers	Type I Multiplier	(Direct + indirect)/direct	1.45
	Type II Multiplier	(Direct + indirect + induced)/direct	1.92

Sector	Effect
Electronics equipment	47,989
Construction	131,360
Communications	47,675
Total	227,024

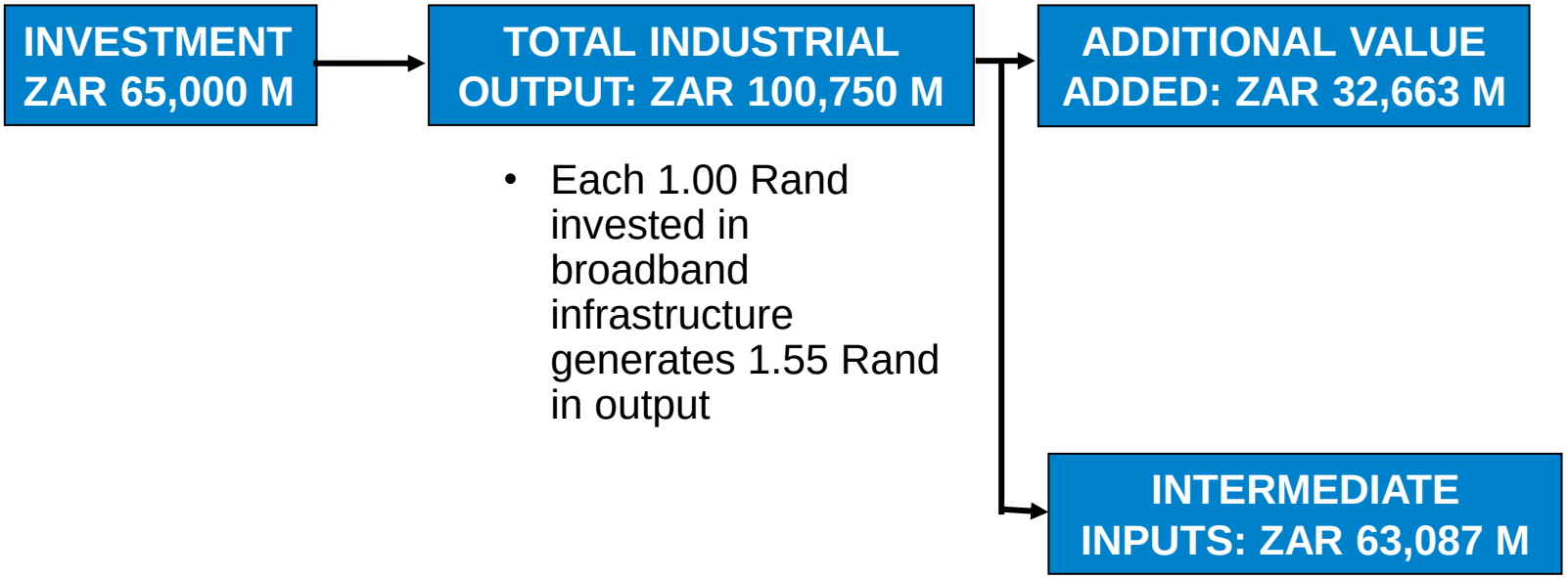
Sector	Effect
Distribution	15,396
Finance	4,461
Metal products	6,907
Electrical Eq.	4,604
Other services	24,461
Other	46,332
Total	102,161

Source: Methodology reviewed in Katz (2012)

Note: The estimation was made using the input/output matrix of United States. Then the results are corrected using the added value of South Africa in relation to the United States (32.42% vs 56.17%)

A In addition, the implementation of the broadband policy will create a significant amount of value added

ESTIMATION OF AGGREGATE SHORT-TERM (FOUR YEARS) IMPACT OF BROADBAND DEPLOYMENT PLAN



Source: Own calculations using South Africa's 2009 Draft Input-Output Table

Having estimated the economic impact of broadband construction, we will now move to estimating the economic spill-overs

A

IMPACT OF BROADBAND CONSTRUCTION

Format the I/O table	Calculate multipliers	Calculate Impact of Investment
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→ **Short term Keynesian effect**

B

IMPACT OF BROADBAND SPILL-OVERS

Assess historical impact based on econometric model	Estimate future change in penetration and use metrics	Stipulate impact on employment and GDP growth
• Standardize cross-sectional time series • Estimate parameters	• Broadband penetration • Systematic change in utilization of services	• Rely on independent variables of econometric models

→ **Medium and long term effects on the economy as a whole**

B Economic effects of broadband are predicated not only on infrastructure accessibility but primarily on use

Productivity	• Improvement of productivity as a result of the adoption of more efficient business processes enabled by broadband	**• Marketing of excess inventories** **• Optimization of supply chains**
Innovation	• Acceleration of innovation resulting from the introduction of new broadband-enabled applications and services	**• New applications and services (telemedicine, Internet search, e-commerce, online education, VOD and social networking)** **• New forms of commerce and financial intermediation**
Value chain recomposition	• Attract employment from other regions as a result of the ability to process information and provide services remotely	**• Outsourcing of services** **• Virtual call centers** **• Core economic development clusters**

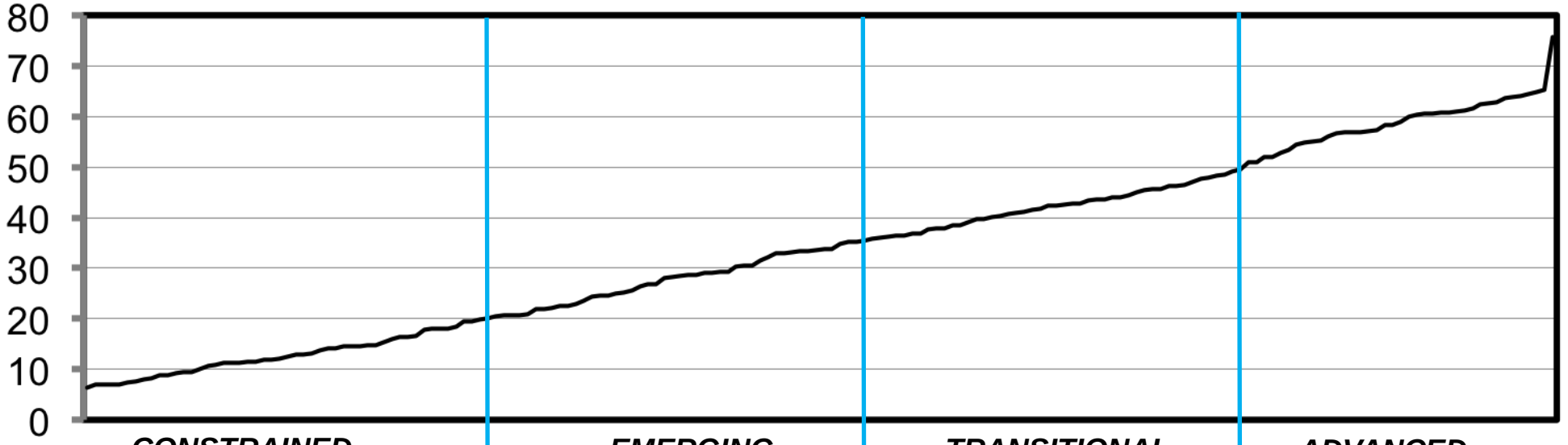
B Therefore, rather than estimating the economic impact of broadband alone, we have relied on a digitization index

DIGITIZATION INDEX

Indicators	Components	Sub-components
Affordability	Residential fixed line cost adjusted for GDP per capita	Residential fixed line tariff (3 minute call to a fixed line at peak rate) adjusted for GDP per capita
		Residential fixed line connection fee adjusted for GDP per capita
	Mobile cellular cost adjusted for GDP per capita	Mobile cellular prepaid tariff (1 minute call off-net at peak rate) adjusted for GDP/capita
		Mobile cellular prepaid one-time connection fee adjusted for GDP per capita
	Fixed broadband Internet access cost adjusted for GDP per capita	Monthly residential price for a fixed broadband connection
Infrastructure reliability	Investment in telecommunications per telecom subscriber (mobile, broadband and fixed)	Mobile investment per capita
		Broadband investment per capita
		Fixed line investment per capita
Network Access	Network penetration	Fixed Broadband penetration
		Mobile Phone penetration
	Other penetration metrics and coverage infrastructure	Mobile broadband penetration
		PC Population penetration
		Mobile cellular network coverage
Capacity	International Internet bandwidth	International Internet bandwidth (kbps/user)
	Broadband speed	Broadband speed (% of connections with download speed over 2 Mbps)
Usage	Internet retail	Internet retail as percent of total retail
	e-Government	E-government Web measure index
	Individuals using the internet	Percentage of individuals using the Internet
	Non-voice services as % of wireless ARPU	Non-voice (data, message, VAS) spending as percentage of wireless ARPU
	Social network visitors	Dominant Social Network Unique Visitors per month Per Capita
	SMS usage	SMS usage per subscriber
Human Capital	Engineers	Engineers as a percentage of total population
	Skilled Labor	Labor force with more than a secondary education as a percentage of the total labor force

Source: Katz and Koutroumpis (2013)

B The index was calculated for 184 countries, indicating that countries tend to follow four developmental stages



CONSTRAINED

- Burundi
- Malawi
- Madagascar
- Central African Republic
- Mali Dem.
- Rep. Congo
- Comoros
- Niger
- Solomon Islands
- Papua New Guinea
- Mozambique
- Afghanistan
- Lesotho
- Burkina Faso
- Zimbabwe
- Uganda
- Myanmar
- Togo
- Vanuatu
- Sierra Leone
- Tanzania
- The Gambia
- Senegal
- Ethiopia
- Sao Tome and Principe
- Rwanda
- Congo
- Cameroon
- Guinea
- Zambia
- Turkmenistan
- Mauritania
- Angola
- Tuvalu
- Lao PDR
- Nepal
- Benin
- Tajikistan
- Timor-Leste
- Ghana
- Samoa
- Nigeria
- Swaziland
- Eritrea
- Cote d'Ivoire
- Djibouti
- Yemen
- Iraq
- West Bank and Gaza
- Nicaragua

EMERGING

- Kenya
- Bangladesh
- VIrgin Islands
- Cambodia
- Cuba
- Tonga
- Guatemala
- Honduras
- Fiji
- New Caledonia
- Bolivia
- Guyana
- Syrian Arab Republic
- Kyrgyz Republic
- Namibia
- Pakistan
- Uzbekistan
- India
- Bhutan
- Gabon
- Sri Lanka
- Cape Verde
- Morocco
- Libya
- Belize
- Vietnam
- Egypt
- Maldives
- El Salvador
- Paraguay
- Trinidad and Tobago
- Sudan
- Albania
- Dominican Republic
- Algeria
- Tunisia
- China
- Macao SAR
- Venezuela
- Jamaica
- South Africa
- Jordan
- Thailand
- Indonesia
- Bosnia and Herzegovina

TRANSITIONAL

- Peru
- Iran
- Lebanon
- Botswana
- Oman
- Seychelles
- Ecuador
- Philippines
- Andorra
- Armenia
- Macedonia
- Azerbaijan
- Brazil
- Antigua and Barbuda
- Dominica
- Bahrain
- San Marino
- Mexico
- Bermuda
- Barbados
- Costa Rica
- Colombia
- Moldova
- Ukraine
- Saudi Arabia
- Montenegro
- Georgia
- Aruba
- Turkey
- Croatia
- Panama
- Brunei
- St. Vincent
- Kazakhstan
- Argentina
- Puerto Rico
- St. Lucia
- Liechtenstein
- Serbia
- Estonia
- Hungary
- Qatar
- Malaysia
- Kuwait
- Taiwan
- Uruguay
- Slovak Republic
- Latvia
- Chile
- Cyprus

ADVANCED

- Mongolia
- Greece
- Russia
- Poland
- Bulgaria
- UAE
- Italy
- Spain
- Romania
- Lithuania
- Czech Rep.
- Slovenia
- Japan
- New Zealand
- Germany
- Malta
- Mauritius
- Portugal
- Belarus
- Austria
- France
- Singapore
- Iceland
- Netherlands
- Australia
- Belgium
- Ireland
- Hong Kong
- Sweden
- United States
- Luxembourg
- Israel
- Korea
- Switzerland
- Canada
- United Kingdom
- Denmark
- Finland
- Norway

Source: Katz, Koutroumpis, and Callorda (2013)

B The economic impact of digitization is measured through an endogenous growth model that links GDP to the Fixed Stock of Capital, Labor Force and the Digitization index

- Cobb-Douglas function:

$$Y=A_{(t)}(K_{it})^{a}(L_{it})^{b}$$

where:

- $A_{(t)}$ indicates the level of digitization
- K corresponds to fixed capital formation
- L to labor force

GDP (GDP_{it})	
Fixed Capital Stock (K_{it})	0.1632 ***
Labor (L_{it})	0.1406 ***
Digitization Index (D_{it})	0.0814 ***
Constant	18.23 ***
Year Effects	YES
Country Effects	YES
Observations	783
R^{2}	0.9051

*** denote statistical significance at the 1% level

$$\log(GDP_{it})=a_1\log(K_{it})+a_2\log(L_{it})+a_3\log(D_{it})+\varepsilon_{it}$$

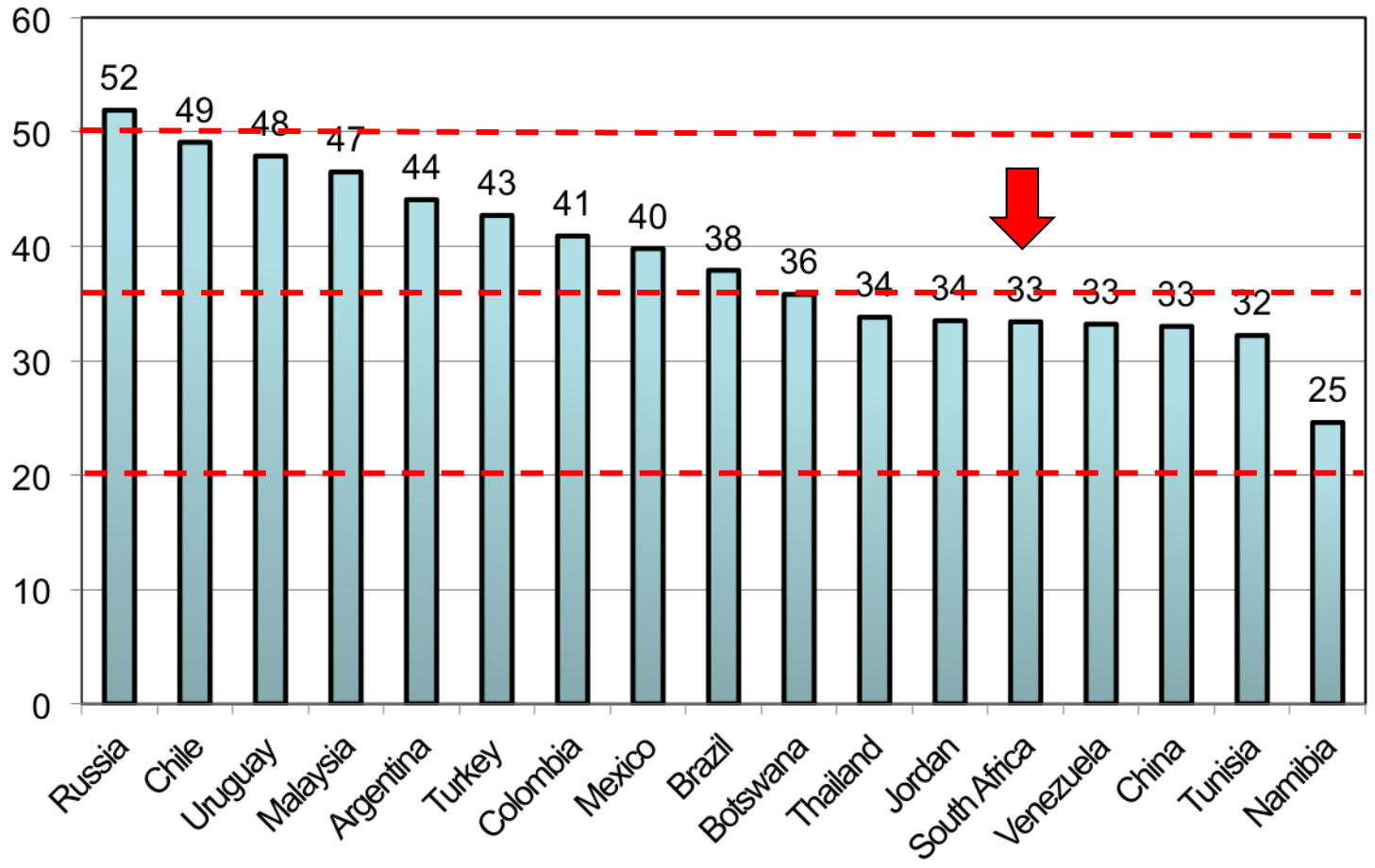
Source: Katz, Koutroumpis, Callorda (2012)

B The Digitization Index is found to have a positive effect indicating a strong effect on economic output

- The index is a weighted average of different indicators that might be endogenous to GDP, like broadband and mobile penetration. However their impact on the metric – these two metrics combined account for 5% of the index - seems insignificant
- Additionally it is hard to find an instrument that could possibly control for this effect
- Given the small effect we expect it has on GDP we extended the analysis controlling for country and year fixed effects to help mitigate potential problems and account for the heterogeneity of our sample
- All variables are significant at the 1% level. As expected, the capital formation is positive. Labor contribution to GDP is also consistent; quality is often crucial in this case but the overarching concept is largely accepted
- One point increase in the Digitization Index has approximately a 0.08% impact on GDP
- This significant finding stipulates that full economic impact of ICT is achieved through the cumulative adoption of all technologies, in addition to their assimilation and usage in the production and social fabric

B South Africa has a Digitization Index of 33.4

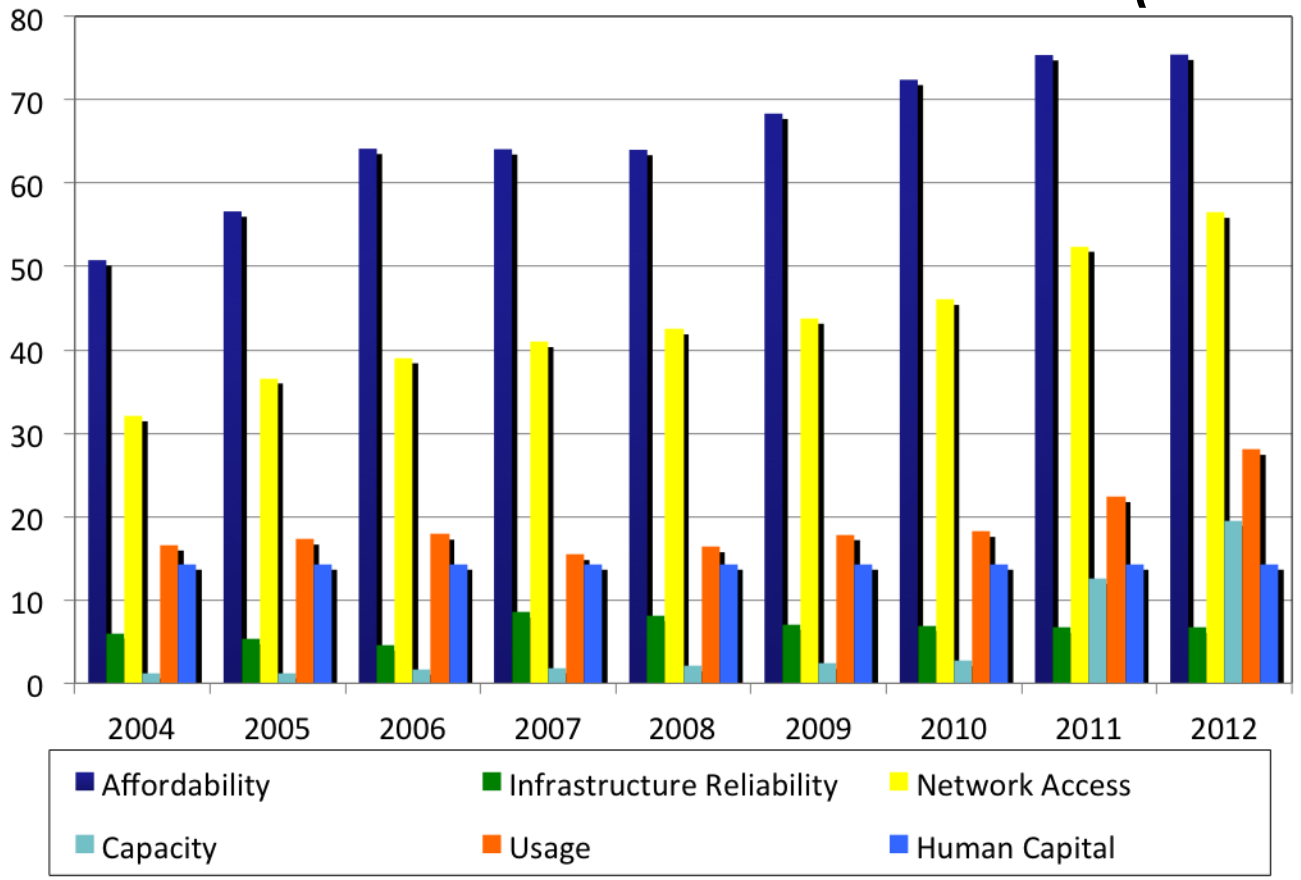
SELECTED UPPER MIDDLE INCOME COUNTRIES: DIGITIZATION INDEX (2012)



Source: Own calculations using Katz, Koutroumpis and Callorda (2013b)

B In the last eight years, South Africa has improved in its digitization index, primarily in mobile affordability and access

SOUTH AFRICA: DIGITIZATION INDEX (2004-2012)



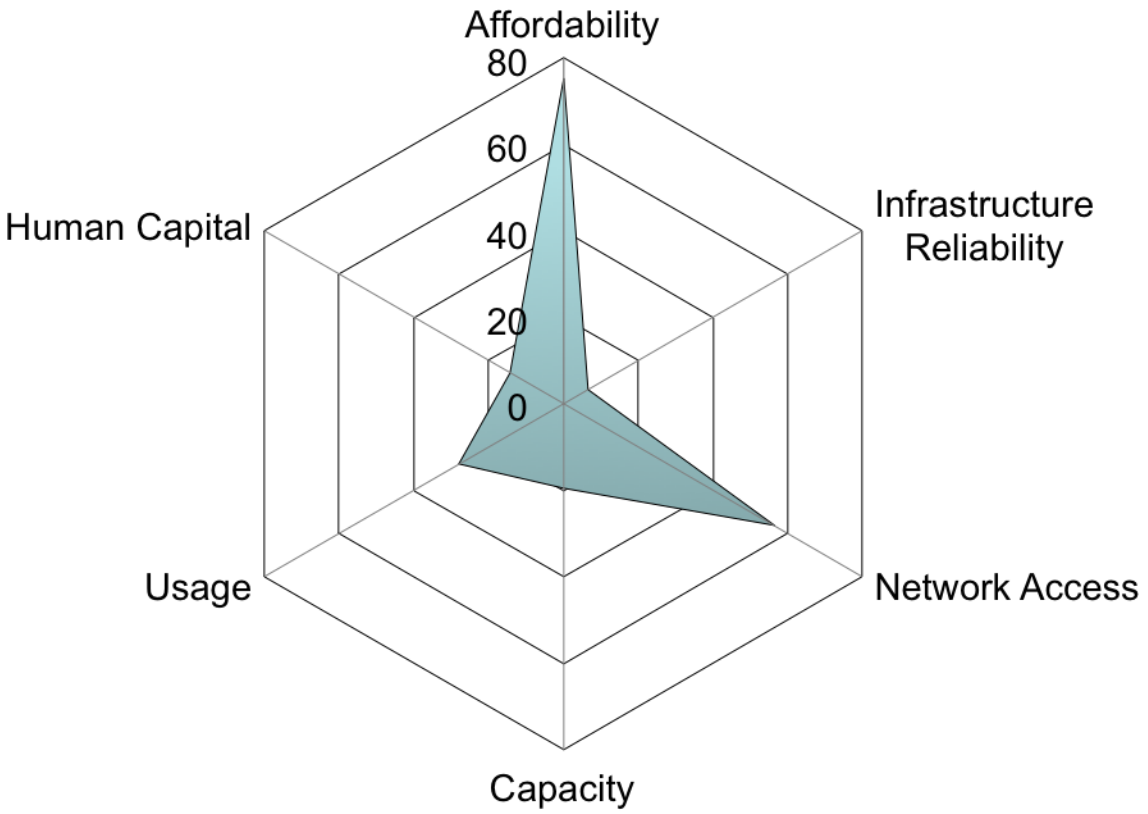
Sub-Index	CAGR (%)
Affordability	4,50%
Infrastructure Reliability	1,15%
Network Access	6,49%
Capacity	36,10%
Usage	6,02%
Human Capital	0,00%

2004	2005	2006	2007	2008	2009	2010	2010	2012	CAGR (%)
20.15	21.89	23.58	24.18	24.55	25.61	26.75	30.61	33.40	5.77 %

Source: Own calculations using Katz, Koutroumpis and Callorda (2013b)

B South Africa has developed in the affordability and network access sub-indices, but also made progress in usage and infrastructure

SOUTH AFRICA: DIGITIZATION INDEX AND SUB-INDICES (2012)



Source: Own calculations using Katz, Koutroumpis and Callorda (2013b)

B To estimate the spill-over impact of South Africa Connect, we need to re-iterate the metrics used to build the Digitization Index

SOUTH AFRICA: COMPONENTS OF THE DIGITIZATION INDEX (2012)

Indicators			Pilars		Digitization Index
Description	Metric	Index	Description	Subindex	
Residential fixed line tariff (3 minute call to a fixed line at peak rate) adjusted for GDP per capita	US$ 0.17	80.88	Affordability	75.42	33.40
Residential fixed line connection fee adjusted for GDP per capita	US$ 71.68	78.21			
Mobile cellular prepaid tariff (1 minute call off-net at peak rate) adjusted for GDP/capita	US$ 0.38	79.23			
Mobile cellular prepaid one-time connection fee adjusted for GDP per capita	US$ 22.01	51.13			
Monthly residential price for a fixed broadband connection adjusted for GDP per capita	US$ 28.10	81.54			
Investment per telecom subscriber (mobile, broadband and fixed)	US$ 31.49	6.67	Infrastructure reliability	6.67	
Fixed Broadband penetration	2.18%	3.16	Accessibility	56.47	
Mobile Phone penetration	134.80%	89.97			
Mobile broadband penetration	32.30%	32.97			
PC Population penetration	N/A	N/A			
Mobile cellular network coverage	100%	100			
International Internet bandwidth (kbps/user)	18,700	19.51	Capacity	19.51	
Broadband speed (% of connections with download speed over 2 Mbps)	N/A	N/A			
Internet retail as percent of total retail	0.49%	4.98	Utilization	28.04	
E-government Web measure index	45.75	46.29			
Percentage of individuals using the Internet	41.00%	41.59			
Non-voice (data, message, VAS) spending as percentage of wireless ARPU	24.72%	50.94			
Dominant Social Network Unique Visitors per month Per Capita	12.84%	21.37			
SMS usage per subscriber	34	3.09			
Engineers as a percentage of total population	N/A	N/A	Human Capital	14.27	
Labor force with more than a secondary education as a percentage of the total labor force	13.40%	14.27			

Source: Own calculations using Katz, Koutroumpis and Callorda (2013b)

B According to the economic impact model, digitization in South Africa has created ZAR 38,500 million in GDP and 204,000 jobs/year

SOUTH AFRICA: DIGITIZATION ECONOMIC IMPACT (2004-2012)

	2004	2005	2006	2007	2008	2009	2010	2011	2012	Total
Digitization Index	20.15	21.89	23.58	24.18	24.55	25.61	26.75	30.61	33.40	-
GDP created (in Million ZAR)	-	3,478	3,602	1,397	828	2,484	3,509	13,352	9,853	38,502
Jobs created ('000)	-	25	26	9	6	16	18	60	44	204

Source: Own calculations using Katz, and Koutroumpis(2013b)

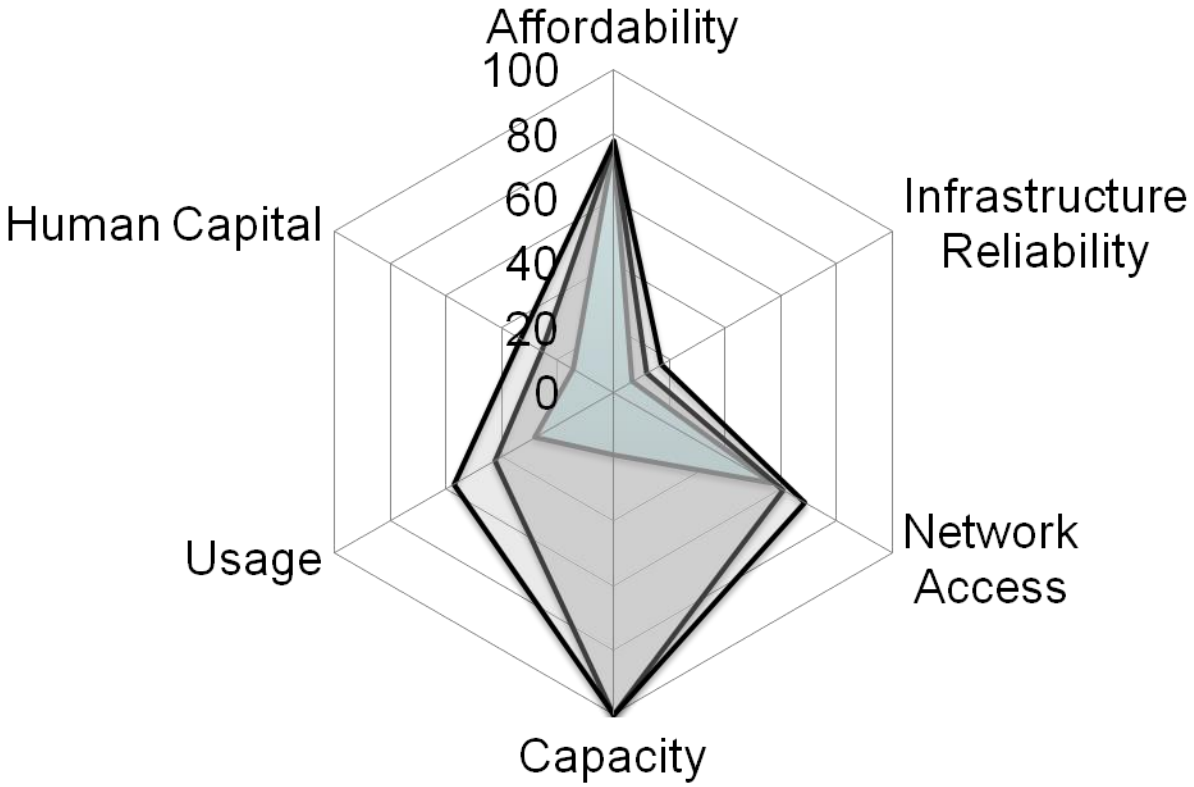
B Looking forward, based on South Africa Connect targets, an increase in digitization indicators was stipulated for 2015 and 2020

Indicators	2012			2015 (*)			2020 (**)		
	Metric	Sub-Index	Index	Metric	Sub-Index	Index	Metric	Sub-Index	Index
Residential fixed line tariff (3 minute call to a fixed line at peak rate) adjusted for GDP per capita	US$ 0.17	80.88		US$ 0.17	80.88		US$ 0.17	80.88	
Residential fixed line connection fee adjusted for GDP per capita	US$ 71.68	78.21		US$ 71.68	78.21		US$ 71.68	78.21	
Mobile cellular prepaid tariff (1 minute call off-net at peak rate) adjusted for GDP/capita	US$ 0.38	79.23		US$ 0.38	79.23		US$ 0.38	79.23	
Mobile cellular prepaid one-time connection fee adjusted for GDP per capita	US$ 22.01	51.13		US$ 18.71	58.31		US$ 15,41	65.48	
Monthly residential price for a fixed broadband connection adjusted for GDP per capita	US$ 28.10	81.54		US$ 28.10	81.54		US$ 28.10	81.54	
Investment per capita (mobile, broadband and fixed)	US$ 31.49	6.67		US$ 60.22	11.85		US$ 88.95	17.03	
Fixed Broadband penetration	2.18%	3.16		14.28%	15.14		26.37%	27.11	
Mobile Phone penetration	134.80%	89.97		134.80%	89.97		134.80%	89.97	
Mobile broadband penetration	32.30%	32.97		46.44%	46.98		60.58%	60.97	
PC Population penetration	N/A	N/A	33.40	60%	60.4	52.94	73.79%	74.05	58.98
Mobile cellular network coverage	100%	100		100%	100		100%	100	
International Internet bandwidth (kbps/user)	18,700	19.51		100,000	100		220,047	100	
Broadband speed (% of connections with download speed over 2 Mbps)	N/A	N/A		100%	100		100%	100	
Internet retail as percent of total retail	0.49%	4.98		2.22%	18.86		3.95%	32.78	
E-government Web measure index	45.75	46.29		59.28	59.69		72.81	73.08	
Percentage of individuals using the Internet	41.00%	41.59		58.40%	58.82		75.81%	76.05	
Non-voice (data, message, VAS) spending as percentage of wireless ARPU	24.72%	50.94		30.33%	62.28		35.94%	73.61	
Dominant Social Network Unique Visitors per month Per Capita	12.84%	21.37		28.22%	45.77		43.60%	70.17	
SMS usage per subscriber	34	3.09		150	10.11		283	18.19	
Engineers as a percentage of total population	N/A	N/A		10%	30.7		12%	36.64	
Labor force with more than a secondary education as a percentage of the total labor force	13.40%	14.27		20%	20.8		29.25%	29.96	

(*) Average between South Africa indicator for 2012, and OECD average, if the indicator is higher than South Africa 2012.
(**) Mean of OECD countries, if the indicator is higher than South Africa. Otherwise, South Africa 2012 index.

B Achieving these targets would modify the country's digitization profile

SOUTH AFRICA: DIGITIZATION INDEX AND SUB-INDICES (2012-2020)



Source: Own calculations using Katz, Koutroumpis and Callorda (2013b)

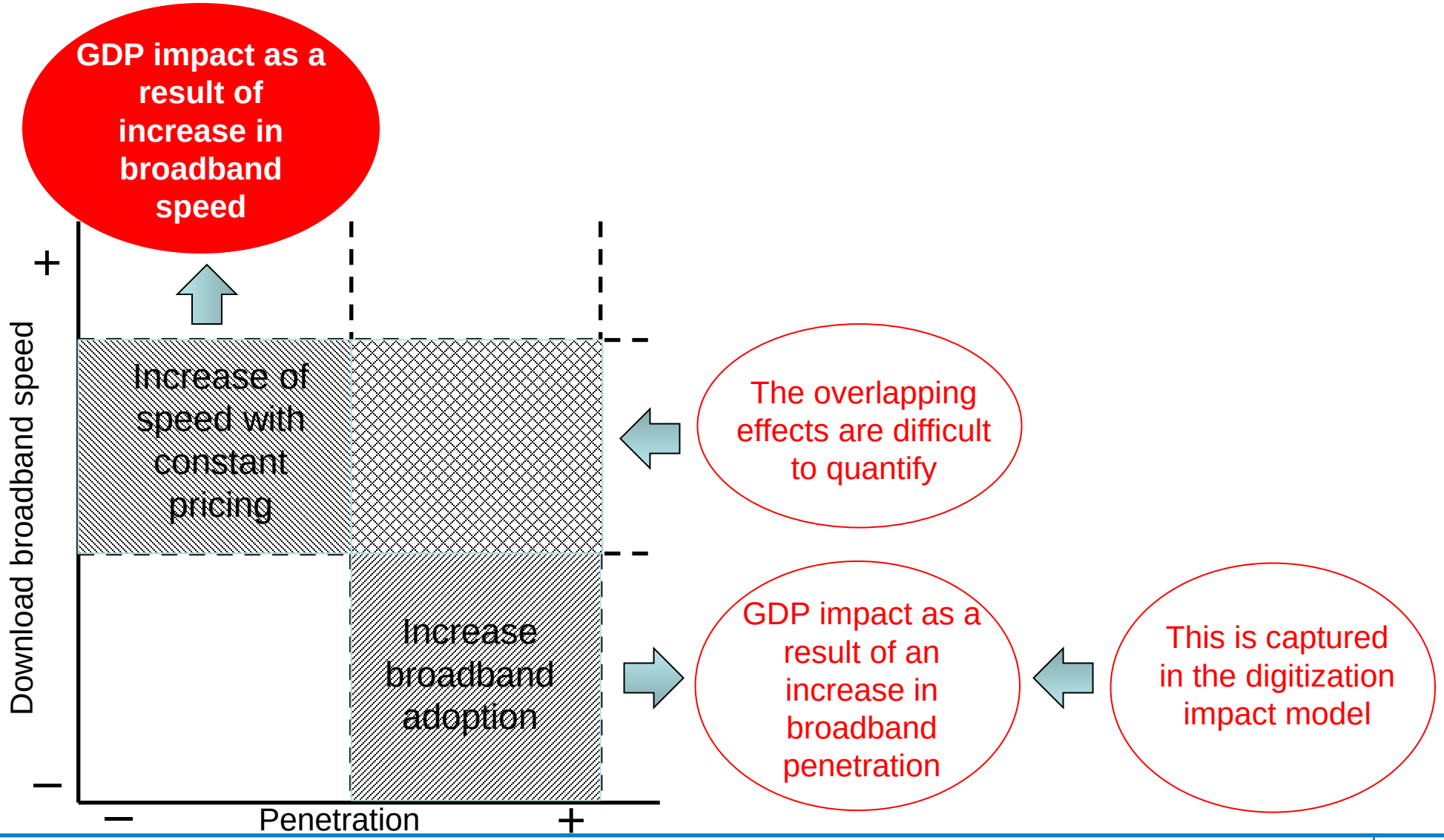
If South Africa met the policy targets and the associated metrics, it would create ZAR 90,397 million in GDP and 400,000 jobs

SOUTH AFRICA: DIGITIZATION CUMMULATIVE ECONOMIC IMPACT (2013-2020)

	2012	2015	2020 (Total)
Digitization Index	33.40	52.94	58.98
GDP created (in Million ZAR)	-	R 69,055	R 90,397
Jobs/Year created ('000)	-	306	400

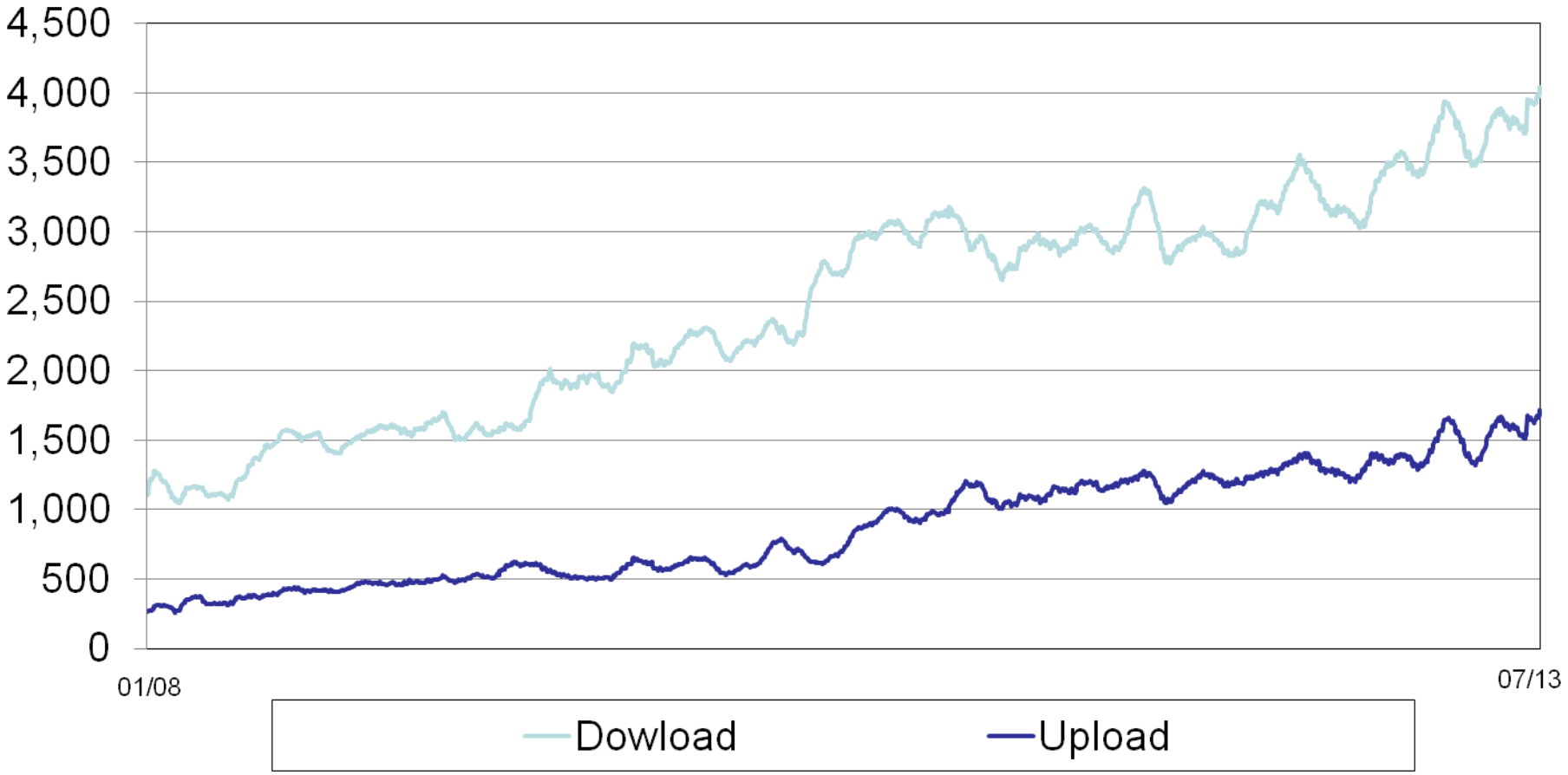
Source: Own calculations using Katz, and Koutroumpis(2013b)

B An additional effect to quantify is the so-called “return to speed”



South Africa's broadband average download speed is 4 Mbp/s and the upload speed is 1.5 Mbp/s

SOUTH AFRICA: EVOLUTION OF BROADBAND SPEED (2008-2013)



Source: Own calculations using Ookla Net Index Data

If the average download speed reaches 100 Mbps by 2020, the policy would have generated an additional ZAR 20,907 M in GDP

SOUTH AFRICA: SPEED ECONOMIC IMPACT

- Bohlin & Rohman (2011) finds that If a country doubles the speed of broadband, the GDP grows in 0.3% for OECD countries
- For BRIC countries, on average, the impact is 32% lower (Bohlin & Rohman, 2013)

	2013	2015	2020
Download Speed	4 Mbp/s	5 Mbp/s	100 Mbp/s
Impact on GDP	-	0.05%	0.93%
GDP created (in Million ZAR)	-	2,163	20,907

Source: Own calculations using Bohlin & Rohman (2011) & Bohlin & Rohman (2013) coefficient for BRIC countries

B Based on the spill-over impact of digitization, the incremental GDP of this scenario is ZAR 111,000 million

SOUTH AFRICA: DIGITIZATION CUMMULATIVE ECONOMIC IMPACT (2013-2020)

Impact		2015	2020
Digitization	GDP (ZAR M)	69,055	90,397
	Employment	306,000	400,000
Speed	GDP (ZAR M)	2,163	20,907
	Employment	-	-
Total	GDP (ZAR M)	71,218	111,304
	Employment	306,000	400,000

An extrapolation of construction and spill-overs in a ten year period yields 400,000 jobs and ZAR 111 billion in output

AGGREGATE IMPACT OF SOUTH AFRICA CONNECT

	2014	2015	2016	2017	2018	2019	2020	Total
EMPLOYMENT								
Construction effect	100,000	100,000	100,000	100,000				400,000
	2014	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**Total**
GROSS DOMESTIC PRODUCT (ZAR '000'000)								
Construction effect	22,600	22,600	22,600	22,600				90,397
Spillovers			4,181	4,181	4,181	4,181	4,181	20,907
Total	22,600	22,600	26,781	26,781	4,181	4,181	4,181	111,304

No externalities due to network under deployment

Externalities discounted to prevent double-counting with I/O estimates

Externalities calculated based on annual model estimates

A preliminary analysis of the economic impact of South Africa Connect appears to be significant

- Generate jobs and output as a result of the construction of networks
  - Estimates for network construction jobs are fairly robust and consistent with prior research
  - Employment multipliers: between 1.45 and 1.92
  - Output multiplier: 1 ZAR invested in infrastructure, generates 1.55 ZAR in additional GDP
- Promote innovation, and creation of new businesses once the networks are deployed
  - Additional 2.56 % in GDP growth
  - Accelerate development of core regions
  - Attract new industries, with employment potential
- Total GDP contribution: ZAR 111,000 million
- Employment as a result of network deployment: 400,000

However, there are some critical elements that the government needs to address to bring more precision to these estimates

- Definition of targets: the ones contained in the draft policy are primarily supply focused, when the **demand side gap** in South Africa appears to be huge (see National development Plan)
  - Current Fixed broadband coverage (75%)- Fixed Broadband penetration HH (10%) = (65%) Demand Gap
  - Current Mobile broadband coverage (80%)- Mobile Broadband penetration (24%)= (56%) Demand Gap
- With such a demand gap, one of the primary obstacles to achieve accessibility is **affordability** (price elasticity of broadband in South Africa approximates 3.16)
- In addition, the **estimation of spill-over impact should be conducted at the country level** controlling for reverse causality, by relying on structural models (see Katz and Koutroumpis, 2012; 2013)
- However, these models require a great deal of **data** to increase the number of observations

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