THE IMPACT OF TAXATION ON BROADBAND PENETRATION AND THE ECONOMY

Telecom Advisory Services, LLC

AGENDA

- The economic contribution of broadband
- The impact of taxation on broadband deployment
- The impact of taxation on broadband adoption
- Policy implications and best practices

TELECOMMUNICATIONS NETWORKS, PARTICULARLY BROADBAND, HAVE A POSITIVE IMPACT ON ECONOMIC DEVELOPMENT

- Generate jobs and output as a result of the construction of networks
  - Estimates for network construction jobs are fairly robust and consistent across prior research
  - Employment multipliers between 1.92 and 3.42 (*)
  - Output multiplier: every dollar invested in network infrastructure generates 0.73 dollars in domestic value added (*)

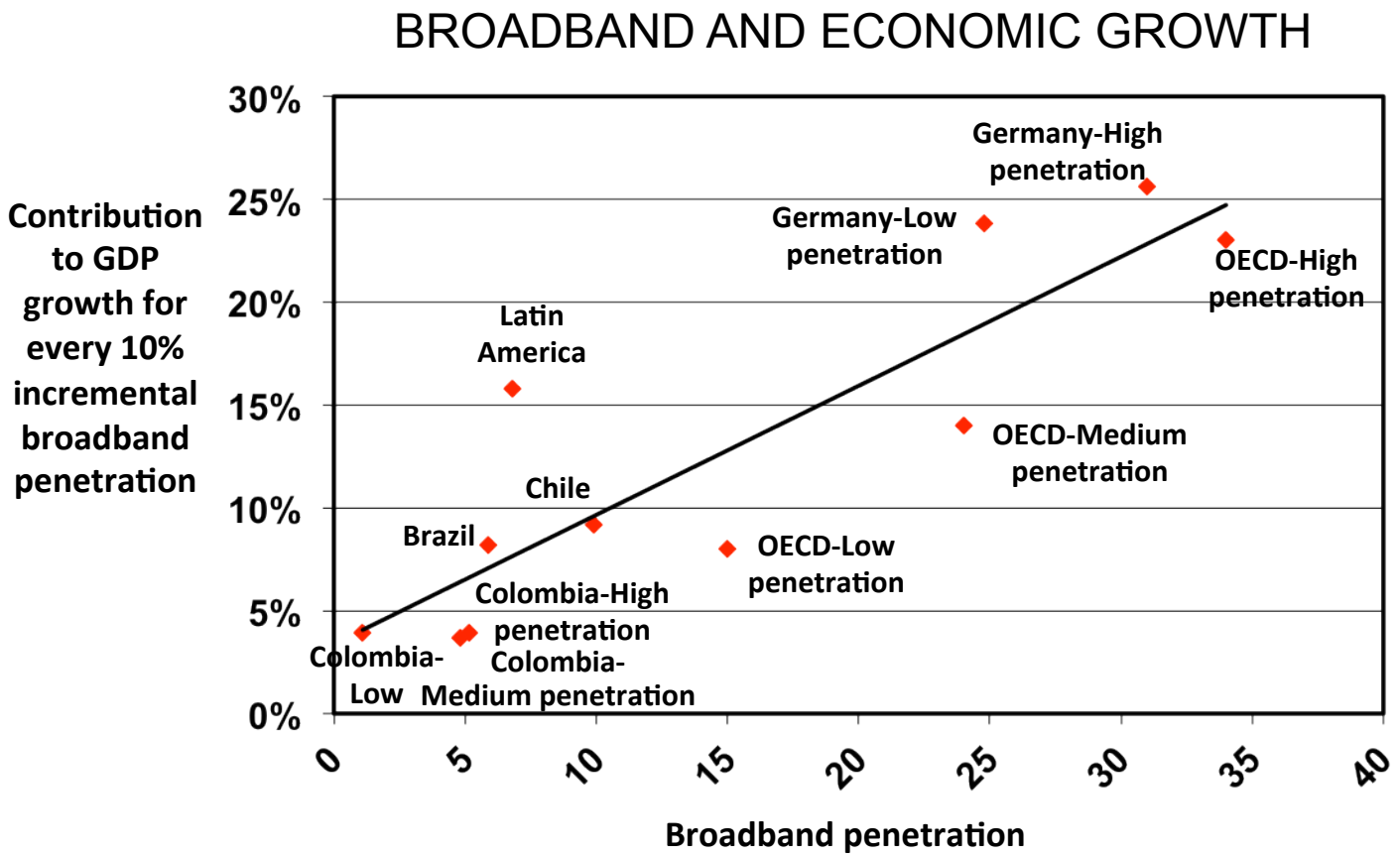
- Promote innovation and create new businesses once the networks are deployed
  - Accelerate development of core regions
  - Attract new industries, with employment potential
  - Improve quality of life which, in turn, attracts investment

(*) Katz, R. (2012). *The economic impact of broadband: research to data and policy issues*. Geneva, Switzerland: International telecommunication Union.

OUR RESEARCH IN LATIN AMERICA CONFIRMS THESE EFFECTS AT THREE LEVELS ACROSS COUNTRIES

COUNTRY	ECONOMIC GROWTH	JOB CREATION	HOUSEHOLD INCOME	STUDY
America Latina	An increase of 10 % in broadband penetration contributes to 0.158% in GDP growth			Katz (2011). The contribution of broadband to economic development. ECLAC
Colombia	An increase of 10 percentage points in broadband contributes 0.036% in GDP growth	An increase of 10 percentage point in broadband connections contributes to 0.003 % to employment rate	An increase on 1 percentage point in broadband connections yields 0.034% in real income per household	Katz and Callorda (2011). Medicion de impacto del plan *Vive Digital*. MITIC
Chile	A 10% increase in broadband penetration will contribute to 0.093% in GDP growth	A 10% increase in broadband penetration leads to 1.85 increase in the employment rate		Katz (2012). The economic impact of broadband. ITU
Panama	Every 10 percentage point in broadband penetration contributes 0.45% to GDP growth			Katz and Koutroumpis (2012). The economic impact of broadband in Panama. BROADBAND COMMISSION
Costa Rica			An increase of 1 percentage point in broadband penetration yields an increase of 2.96% in average household income	Katz (2011). Document prepared for Costa Rica's National Broadband Strategy. RECTORIA DE TELECOMUNICACIONES

FURTHERMORE, THE ECONOMIC CONTRIBUTION OF BROADBAND INCREASES WITH PENETRATION

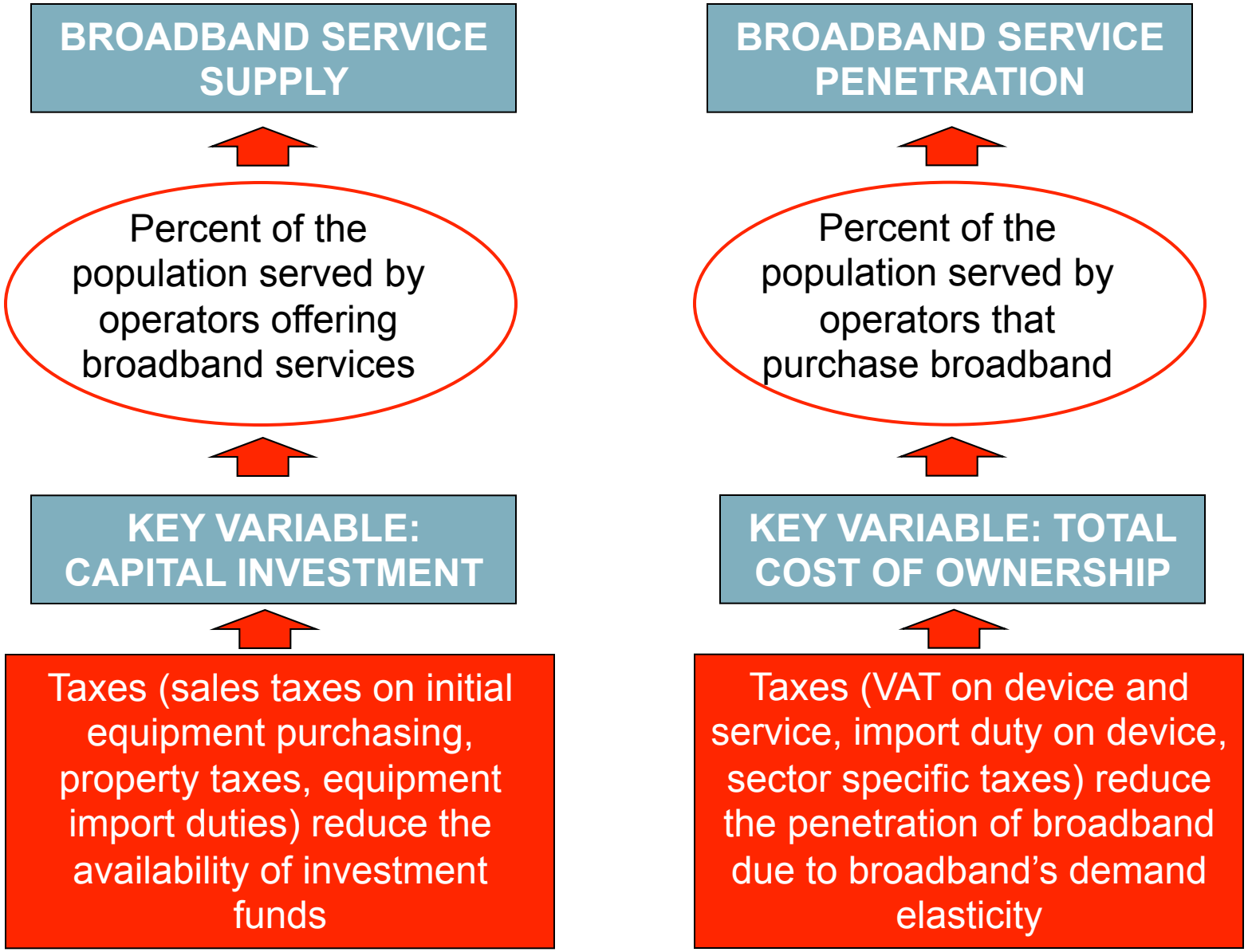


Source: Telecom Advisory services with data from Koutroumpis (2009) and Katz (2011)

UNDER THIS CONSIDERATION, THE MAXIMIZATION OF BROADBAND SUPPLY AND DEMAND BECOMES A KEY PUBLIC POLICY IMPERATIVE

		Type of Target	
		Supply (service coverage)	Demand (broadband penetration)
Perspective	Social imperative: universalization	Achieve universal coverage of the population	Reach, as a minimum, a penetration consistent with the country's economic development
	Economic imperative: impact maximization	Deploy networks and service offering in high economic impact areas	Increase broadband technology adoption among enterprises and public sector to achieve a multiplier effect

HOWEVER, TAXES HAVE A NEGATIVE IMPACT ON BROADBAND PENETRATION BOTH ON THE SUPPLY AND DEMAND FOR BROADBAND



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TAXES MAY AFFECT THE INCENTIVES TO MAKE BROADBAND INVESTMENTS AND REDUCE THE SUPPLY OF FUNDS AVAILABLE TO THEM

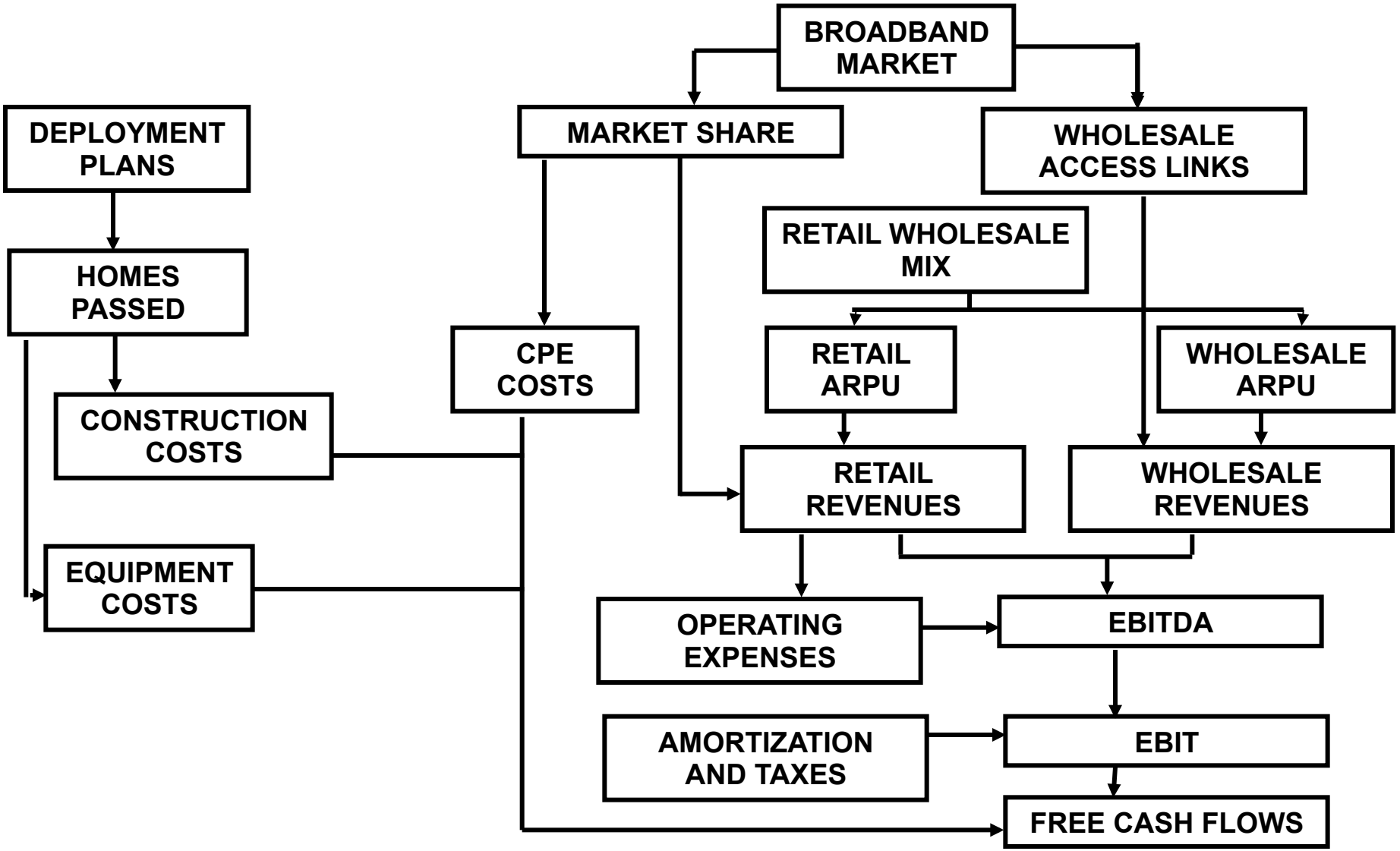
- Since taxes raise the required pre-tax rate of return of capital invested, aggregate capital stock depends on the effective tax rate
  - Over time, a reduction of corporate income taxation determines an increase in the level of gross fixed capital formation
- The impact of taxation varies according to the state of the business cycle
  - During economic expansion, taxes affect the supply of funds more than incentives to invest
  - During downturns, taxes primarily affect incentives to invest
- On the other hand, taxes have an impact on three types of decision
  - Which business?
  - Where to invest?
  - How much to invest?

IN FAIRNESS, TAXES ARE ONLY ONE VARIABLE AFFECTING TELECOMMUNICATIONS INVESTMENT

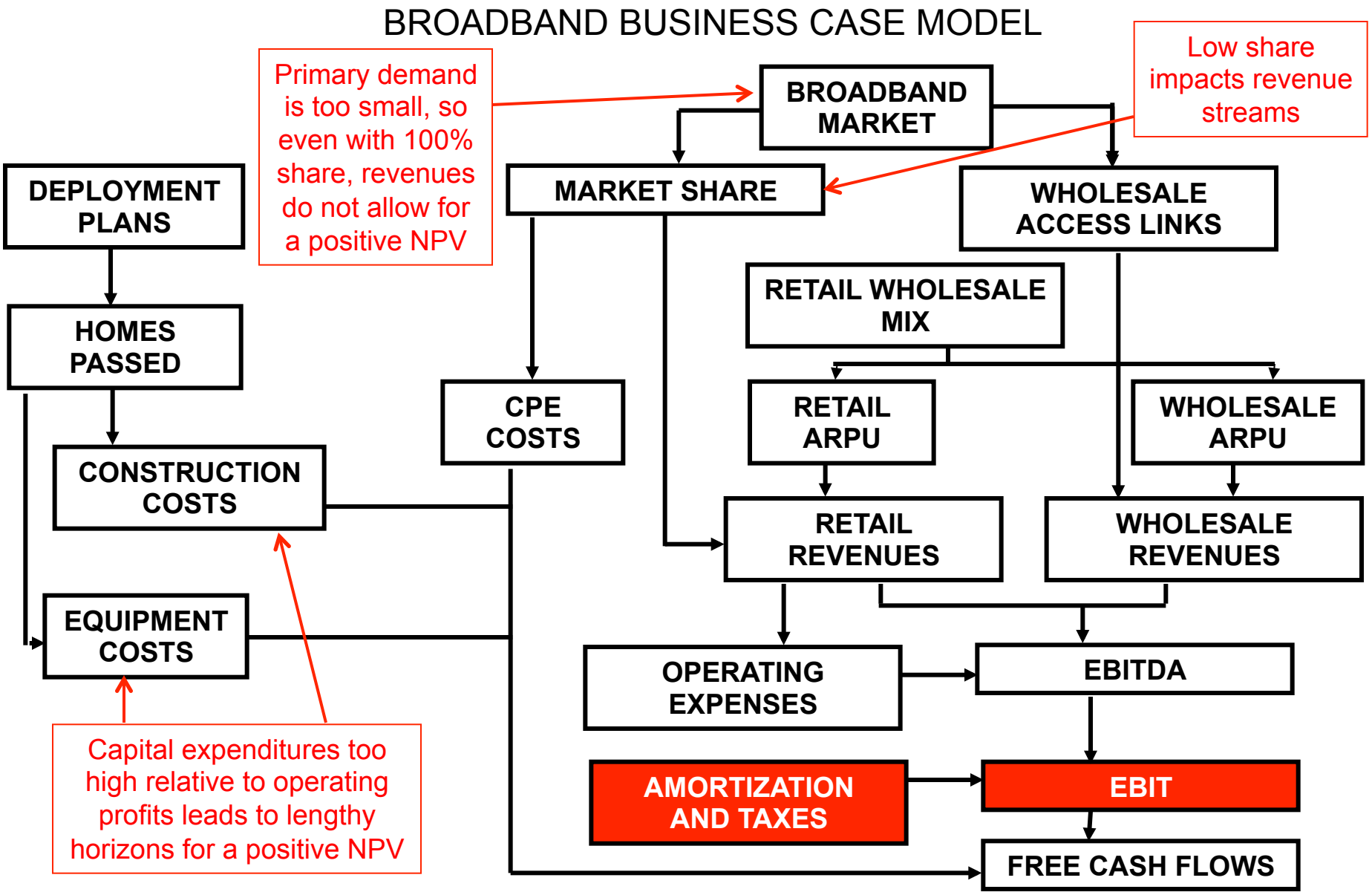
- Capital planning in communications comprise three types of decisions
  - Maintenance of existing plant
  - Capacity upgrades
  - Network modernization
- Taxes affect primarily modernization decisions
  - Maintenance capex is largely multi-year, non discretionary, and less subject to tax effects
  - Capacity upgrades is generally linked to revenue generation opportunities and therefore, less affected by tax regimes
  - Network modernization capex is affected by allocation decisions influenced by taxes
- In addition, telecommunications investment is driven by other non-taxation variables
  - Imperative to capture market share
  - Inertia in budgetary processes

TO ASSESS THE ROLE OF TAXES IN AFFECTING BROADBAND INVESTMENT WE SHOULD BEGIN BY EXAMINING THE STRUCTURE AND DRIVERS OF THE BUSINESS CASE

BROADBAND BUSINESS CASE MODEL



THE ROLE OF TAXATION BECOMES HIGHLY RELEVANT UNDER CONDITIONS OF A CONSTRAINED BUSINESS CASE



AS AN EXAMPLE, WE PRESENT THE RESULTS OF A STUDY ASSESSING THE IMPACT OF TAXATION ON NETWORK EQUIPMENT INVESTMENT, PARTICULARLY BROADBAND, IN THE UNITED STATES

- Based on econometric analyses of the impact of sales taxes on telecommunications and cable TV provider investment in the United States between 2006 and 2010
- Compiled case studies of actual investment behavior resulting from sales tax rate changes in specific states
- Assessed the social and economic impact of enhanced broadband deployment resulting from changes in sales taxes

TELECOMMUNICATIONS AND CABLE TV EQUIPMENT INVESTMENT IN 2010 IN THE UNITED STATES REACHED $42.133 BILLION (OR $137.12 PER CAPITA) (*)

EVOLUTION OF TELECOM AND CABLE TV INVESTMENT PER CAPITA IN THE UNITED STATES (2006-10)

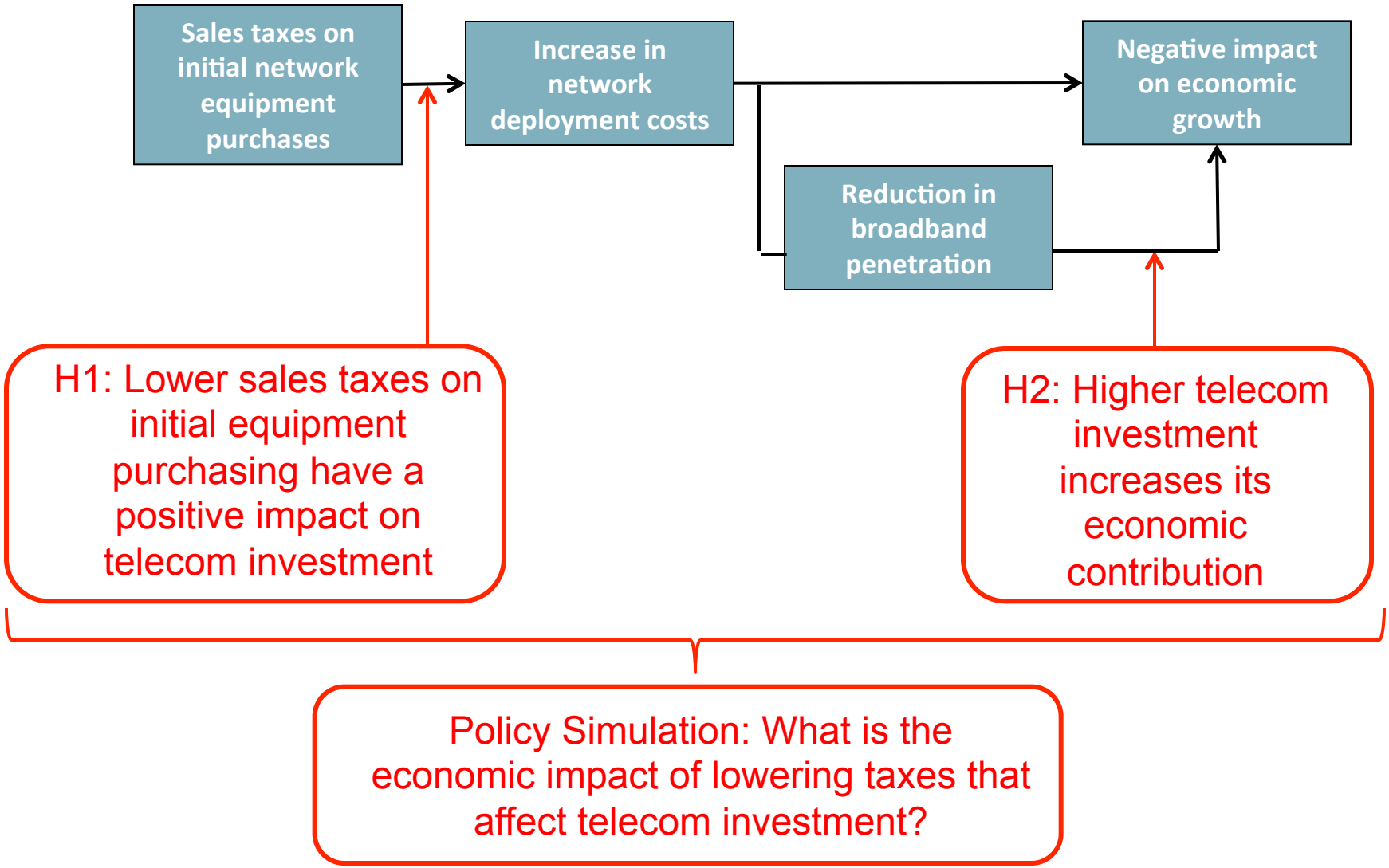
YEAR	2006	2007	2008	2009	2010	Total
Mean Total Investment	$ 141.98	$ 136.12	$ 126.01	$ 116.02	$ 137.12	$ 131.45
Mean Taxable Investment	$ 93.71	$ 89.84	$ 83.17	$ 76.57	$ 90.50	$ 86.76
Std. Dev.	$ 46.15	$ 38.76	$ 38.94	$ 43.01	$ 60.58	$ 46.23
Minimum State	$ 17.03	$ 38.60	$ 29.49	$ 28.39	$ 35.84	$ 17.03
Maximum State	$ 243.57	$ 192.56	$ 214.68	$ 229.50	$ 447.44	$ 447.44

- The industry estimates that approximately 66% of all investment ($27.80 billion or $90.50 per capita) is on equipment subject to sales taxes
- Of the total investment, $1.394 billion was paid in sales taxes (on average 4.02% for telecommunications carriers and 4.45% for cable TV)

(*) This figure represents the sum of the four major telecommunications carriers (ATT, Verizon, Sprint, and Qwest) and almost all cable TV operators. As such, It is estimated that this number represents 80% of all investment by telecommunications carriers and nearly all the cable TV industry

Source: TAS analysis

THE STUDY TESTED TWO HYPOTHESES AND SIMULATED A POLICY OUTCOME



THE ECONOMETRIC MODEL INDICATES THAT A DECREASE OF 1 PERCENTAGE POINT IN THE TAX RATE WOULD INCREASE INVESTMENT IN CABLE TV BY $0.31 PER CAPITA AND $0.85 IN TELECOM

Independent Variables: Sales Tax Rate, Median Income, Population, Human Capital, Rural Population, Investment lagged, Age of Population

Dependent Variable	Cable Investment		Wireless & Wireline Investment	
Sales Tax Rate	-0.3085	*	-0.8529	*
	(0.1586)		(0.5142)	
Median Income (2010 Dollars)	-0.1655		0.5817	*
	(0.1239)		(0.3524)	
Population	0.2508	**	-0.3662	
	(0.0984)		(0.2690)	
Human Capital	0.2382		0.2689	
	(0.1893)		(0.5602)	
Rural Population	-0.0936	**	-0.0620	
	(0.0441)		(0.1461)	
Investment the last year	0.5019	***	0.4375	***
	(0.0465)		(0.0408)	
60 years or more	-0.3200		-8.7256	
	(0.8200)		(6.3690)	
Between 20/34 years	-0.5230		-3.8209	
	(1.2667)		(6.7247)	
Between 5/19 years	-0.8622		-6.9562	*
	(0.6340)		(3.5852)	
Constant	28.6410		434.7922	
	(47.9686)		(301.4056)	
R^2	0.7984		0.4808	
F (9,190)	50.99		37.61	
Prob > F	0.0000		0.0000	
Number of Observations	200		200	

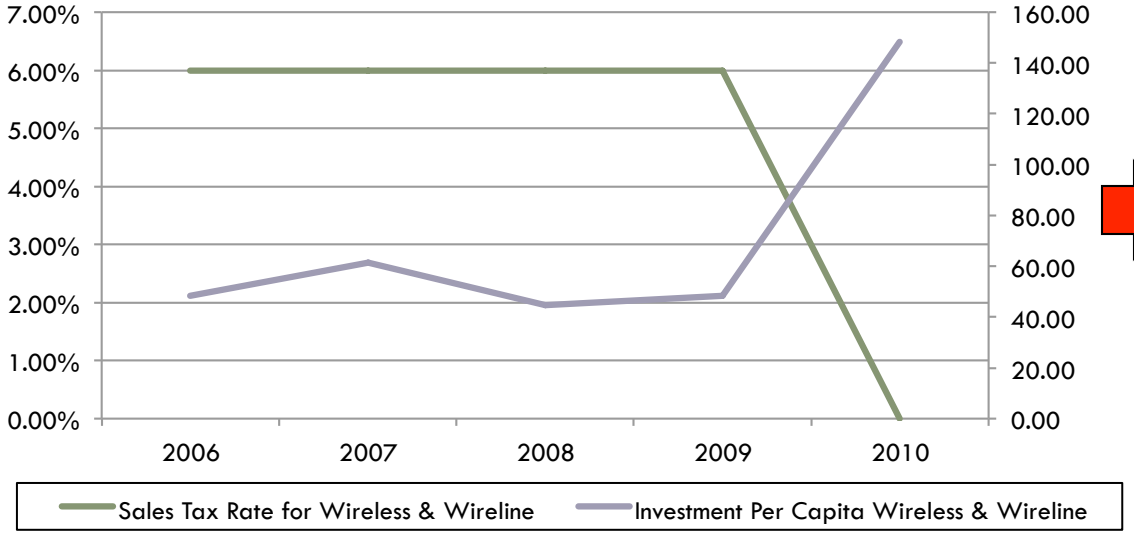
Note: ***, **, * significance at 1%, 5% & 10% level

Source: TAS analysis

THIS EFFECT CAN BE ALSO VERIFIED BY EXAMINING ACTUAL INVESTMENT BEHAVIOR IN SPECIFIC STATES

NORTH DAKOTA: SALES TAX RATE AND TELECOM INVESTMENT (2006-10)

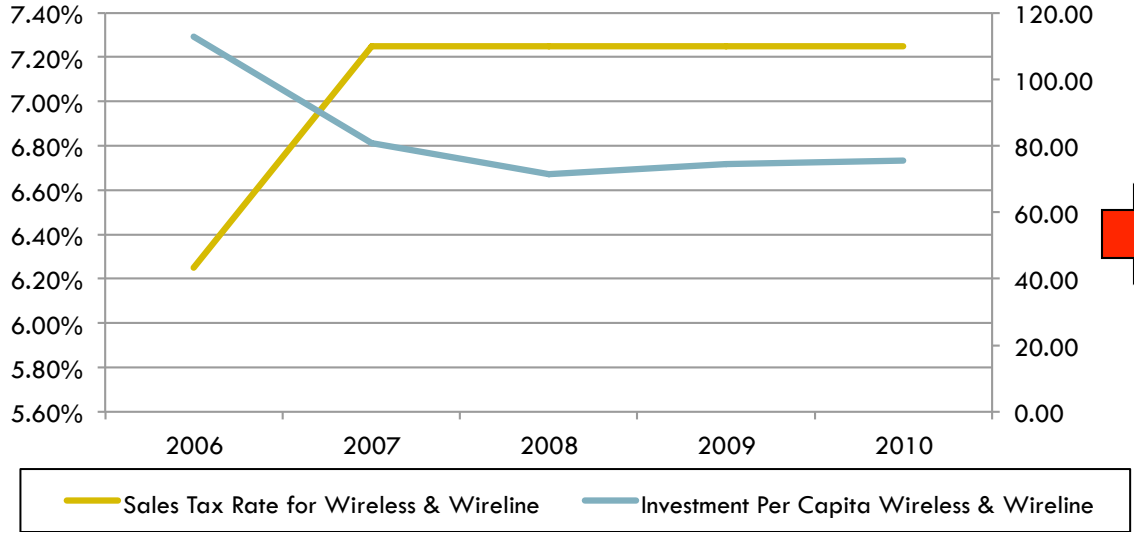
N. Dakota adopted a six-year phase-out of the sales tax on network equipment purchases



Telecom investment increased three-fold from $48 to $148.30 per capita

SOUTH CAROLINA: SALES TAX RATE AND TELECOM INVESTMENT (2006-10)

S. Carolina increased the sales tax rate from 6.25% in 2006 to 7.25% in 2007



Telecom investment decreased 33% from $115.37 to $77.44 per capita

Source: TAS analysis

CONSEQUENTLY, A REDUCTION OF SALES TAXES TO AN AVERAGE OF 2% WOULD GENERATE AN INVESTMENT OF $763 MILLION (BASELINE SCENARIO) IN THE FIRST YEAR

Current Total Telecom Investment (2010): $ 42.133 billion

Total Sale Tax pay for Telecom Investment (2010): $ 1.394 billion

Sales Tax Rate	Scenario 1 (Pessimistic)		Scenario 2 (Baseline)		Scenario 3 (Optimistic)	
	Total Investment Growth	Total Investment	Total Investment Growth	Total Investment	Total Investment Growth	Total Investment
3.00%	0.90%	$ 380,102,600	0.96%	$ 405,704,812	1.11%	$ 466,860,828
2.00%	1.71%	$ 720,140,922	1.81%	$ 763,399,831	2.10%	$ 884,512,727
1.00%	2.52%	$ 1,060,179,244	2.66%	$ 1,121,094,850	3.09%	$ 1,302,164,625
0.00%	3.32%	$ 1,400,217,566	3.51%	$ 1,478,789,870	4.08%	$ 1,719,816,524

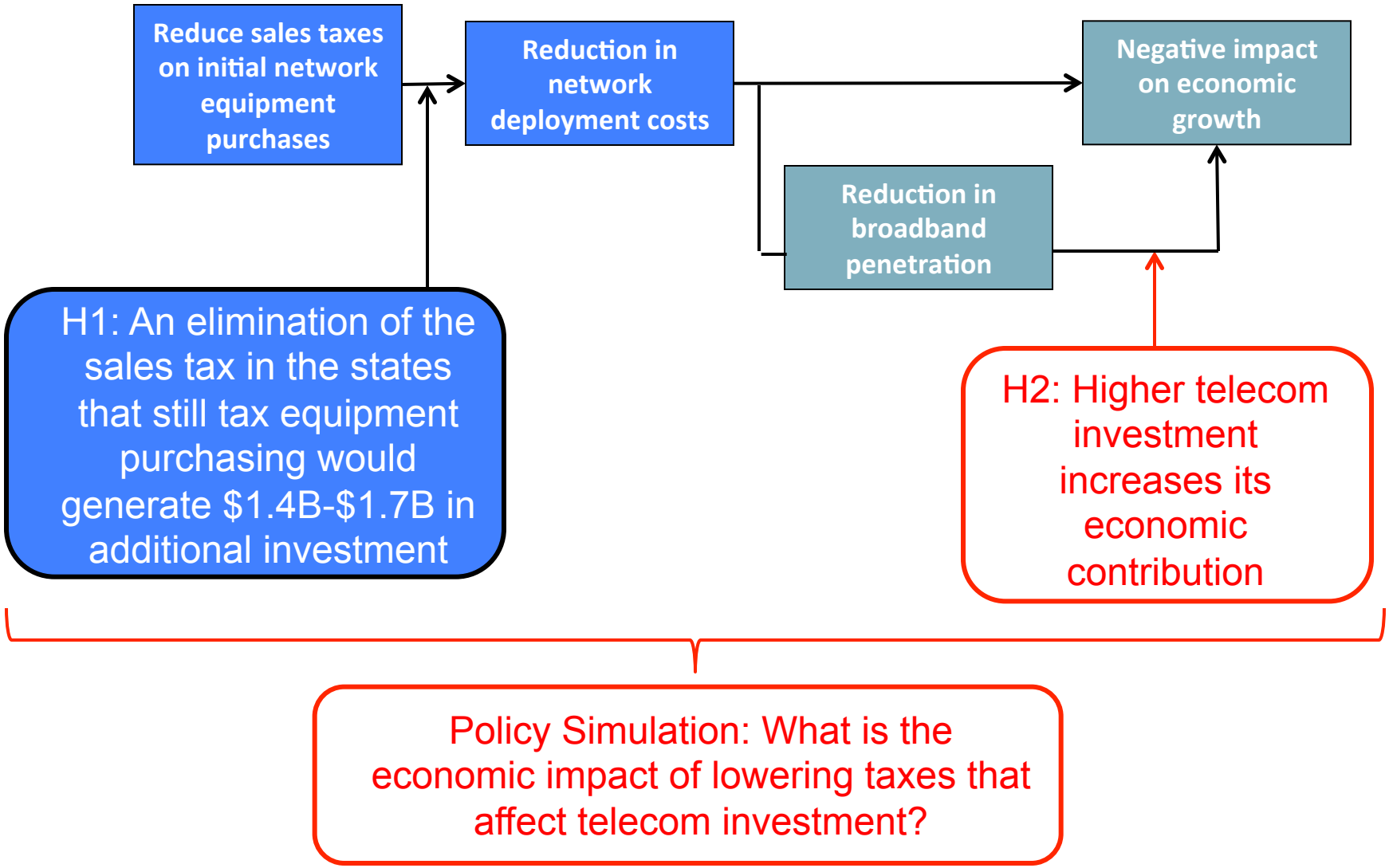
Industry invests the full benefit of tax decrease

Industry invests beyond the supply of funds benefit of the tax decrease (106%)

Industry invests beyond the supply of funds benefit of tax decrease (123%)

Source: TAS analysis

SO FAR, WE HAVE PROVEN THAT A REDUCTION IN SALES TAXES HAS A POSITIVE IMPACT ON TELECOMMUNICATIONS CAPITAL INVESTMENT – LET'S NOW MOVE TO ECONOMIC IMPACT



Source: TAS analysis

INVESTMENT IN BROADBAND TELECOMMUNICATIONS NETWORKS HAS TWO TYPES OF ECONOMIC EFFECTS

DIRECT EFFECTS

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**

INDIRECT EFFECTS

Retail and Wholesale Trade

- Decentralization of warehouses and distribution centers

Health Care

- Deployment of satellite centers for health care delivery

Manufacturing

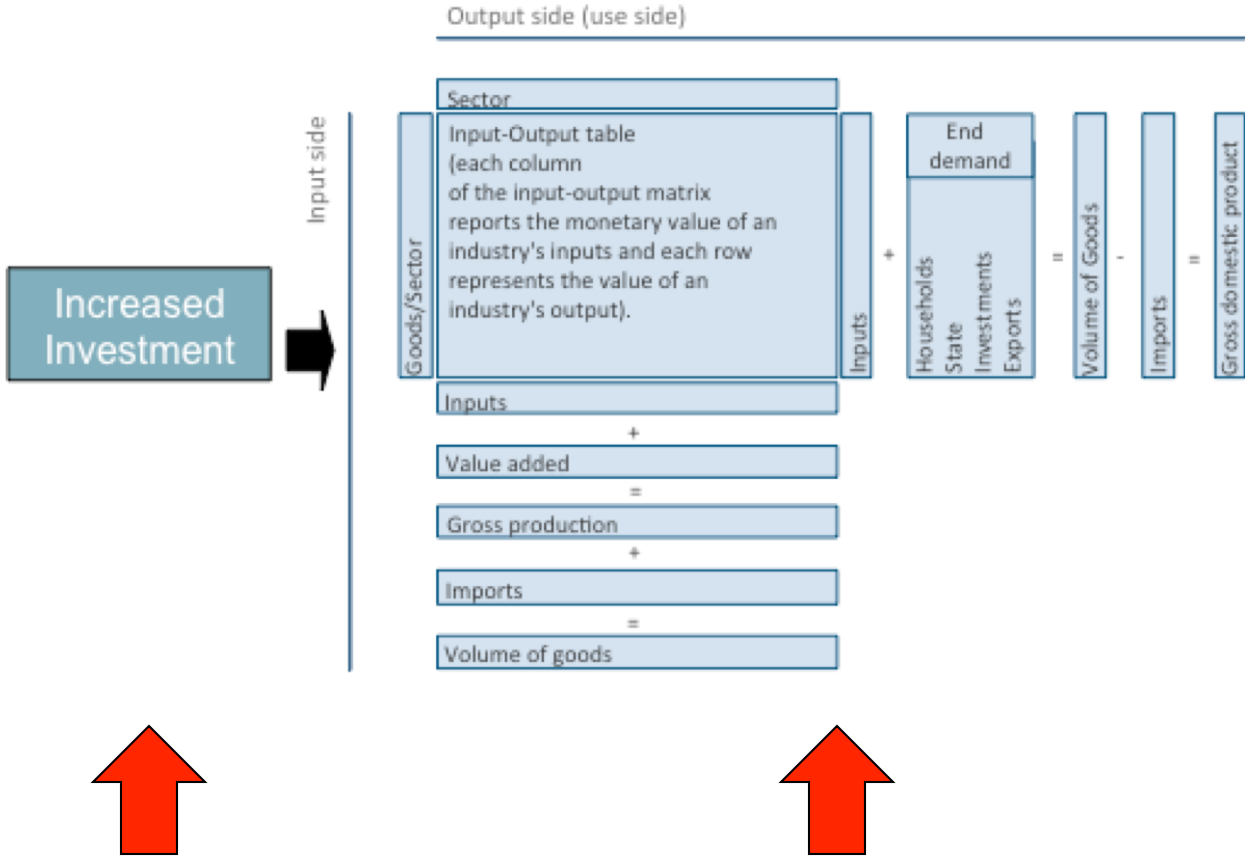
- Optimization of supply chains, marketing expenditures and access to labor pools

Financial Services

- Decentralization of financial processing centers to profit from labor cost arbitraging

TO ESTIMATE THE DIRECT EFFECTS, AN INPUT/OUTPUT MATRIX CALCULATES THE VALUE ADDED AND EMPLOYMENT GENERATED FROM THE ADDIITONAL INVESTMENT

STRUCTURE OF INPUT/OUTPUT MATRIX



- Value added and jobs generated in telecom eq. manufacturing, construction and telecom industry
- Value-added and jobs generated in other industrial sectors
- Total industry output and multipliers

Source: TAS. Investment impact yielded by tax reduction

Source: US Department of Commerce Bureau of Economic Analysis

IT IS ESTIMATED THAT THE ELIMINATION OF SALES TAXES IN THE REMAINING STATES WOULD GENERATE 30,000-37,000 DIRECT JOBS AND $2.8 B - $3.4 B IN OUTPUT

DIRECT SHORT-TERM ECONOMIC EFFECT OF CHANGES IN SALES TAX ON NETWORK EQUIPMENT PURCHASING (ALL $ FIGURES IN BILLIONS)

Sales Tax Rate	Scenario 1 (Pessimistic)			Scenario 2 (Baseline)			Scenario 3 (Optimistic)		
	Investment	Jobs (000)	Output	Investment	Jobs (000)	Output	Investment	Jobs (000)	Output
3.00%	$ 0.38	8	$ 0.76	$ 0.41	9	$ 0.81	$ 0.47	10	$ 0.93
2.00%	$ 0.72	16	$ 1.44	$ 0.76	17	$ 1.53	$ 0.88	19	$ 1.77
1.00%	$ 1.06	23	$ 2.12	$ 1.12	24	$ 2.24	$ 1.30	28	$ 2.60
0.00%	$ 1.40	30	$ 2.80	$ 1.48	32	$ 2.97	$ 1.72	37	$ 3.44

Source: TAS analysis

TO CALCULATE THE INDIRECT EFFECTS, AN ECONOMETRIC MODEL WAS SPECIFIED THAT ESTIMATES THE JOB AND OUTPUT IMPACT OF ADDITIONAL INVESTMENT

Models of Impact of Investment on socio economic factors of U.S. economy (2006-2010)
Fixed effects models by year and state.

Independent Variables (1): Investment Growth, Population Growth
Independent Variables (2): Investment Growth, GDP Growth

Model	Fixed Effects (By Year & State)			
Dependent Variable	GDP Growth (1)		Unemployment Rate Growth (2)	
Investment Growth	0.0138311	***	-0.0750849	*
	(0.0028857)		(0.0479899)	
Population Growth	-1.583572	**		
	(0.6250086)			
GDP Growth			-2.821014	***
			(0.8847934)	
Constant	0.4026913		18.66292	***
	(0.5784295)		(0.953621)	
R^2 adjusted	0.0917		0.1113	
F	13.42		7.19	
Prob > F	0.0000		0.0018	
Number of Groups	50		50	
Number of Observations	200		200	

Note: ***, **, * significance at 1%, 10% & 20% level

- If network investment increases by 1%, state GDP per capita would grow by 0.014% (with a confidence interval between 0.08% and 0.20%)
- If network investment increases by 1%, state unemployment rate would decrease by 0.075% (direct effect)

Source: TAS analysis

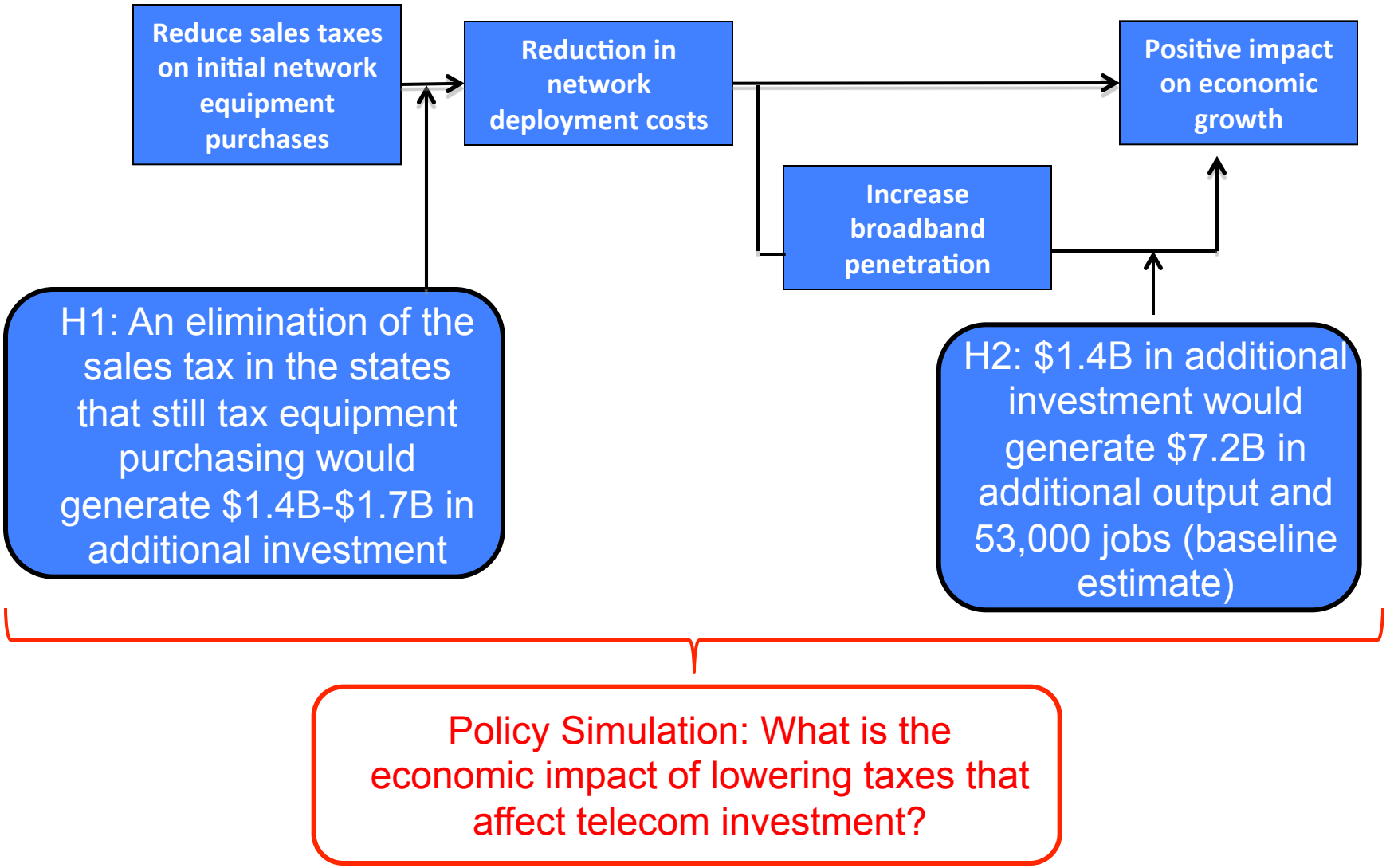
THE INDIRECT EFFECTS COMBINED WITH THE DIRECT EFFECTS WOULD REPRESENT 50,000-62,000 DIRECT JOBS AND $6.8 B - $8.4 B IN OUTPUT

DIRECT AND INDIRECT SHORT-TERM ECONOMIC EFFECT OF CHANGES IN SALES TAX ON NETWORK EQUIPMENT PURCHASING (ALL $ FIGURES IN BILLIONS)

Sales Tax Rate	Scenario 1 (Pessimistic)			Scenario 2 (Baseline)			Scenario 3 (Optimistic)		
	Investment	Jobs (000)	Output	Investment	Jobs (000)	Output	Investment	Jobs (000)	Output
3.00%	$ 0.38	14	$ 1.86	$ 0.41	15	$ 1.99	$ 0.47	17	$ 2.29
2.00%	$ 0.72	26	$ 3.52	$ 0.76	27	$ 3.74	$ 0.88	32	$ 4.33
1.00%	$ 1.06	38	$ 5.19	$ 1.12	40	$ 5.49	$ 1.30	47	$ 6.37
0.00%	$ 1.40	50	$ 6.85	$ 1.48	53	$ 7.24	$ 1.72	62	$ 8.42

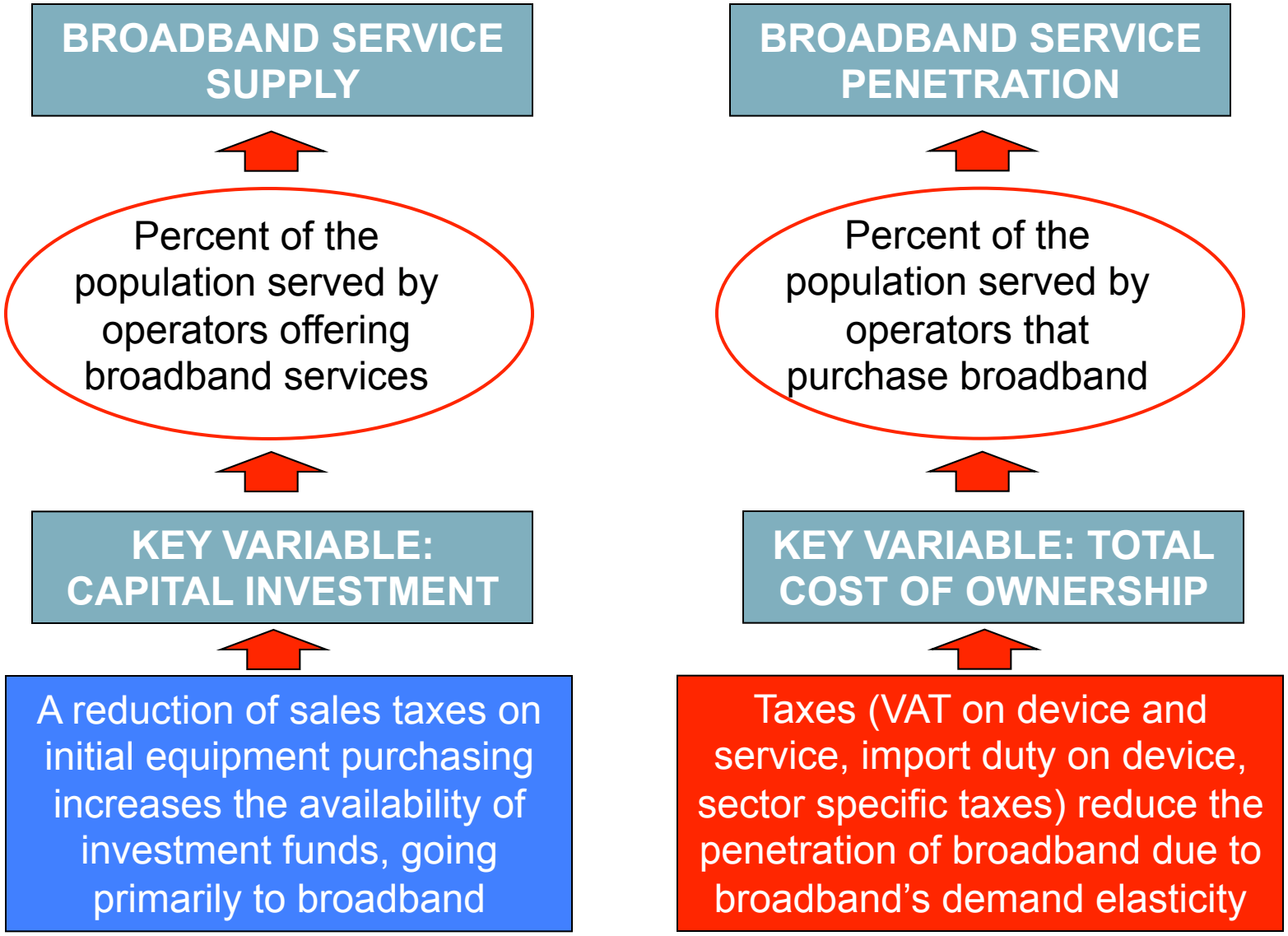
Source: TAS analysis

THIS PROVES THE POSITIVE ECONOMIC CONTRIBUTION THAT A REDUCTION OF SALES TAXES ON EQUIPMENT PURCHASING MIGHT HAVE



Source: TAS analysis

WE HAVE, SO FAR, PROVEN THAT A REDUCTION ON TAXES AFFECTING CAPITAL INVESTMENT HAVE A POSITIVE IMPACT ON BROADBAND – WE WILL MOVE NOW TO IMPACT ON ADOPTION



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TAXES CAN ALSO AFFECT THE ADOPTION OF BROADBAND SERVICES

- Taxes on computer/handset purchasing and service subscription increase the total cost of ownership
  - Value-added taxes and import duties increase the cost of hardware acquisition, reducing penetration and/or hardware upgrade
  - Value-added taxes on service and telecommunications specific fees also restrict broadband adoption and reduce the usage volume (in prepaid offerings)
- Lower broadband service penetration reduces the return to scale of deployment, and consequently its margins
- Lower margins require operators to keep subscription prices high, which further reduces penetration

DIFFERENT APPROACHES TO TAXATION RESULT IN VARYING IMPACT IN HANDSET AND SERVICE ACQUISITION COSTS

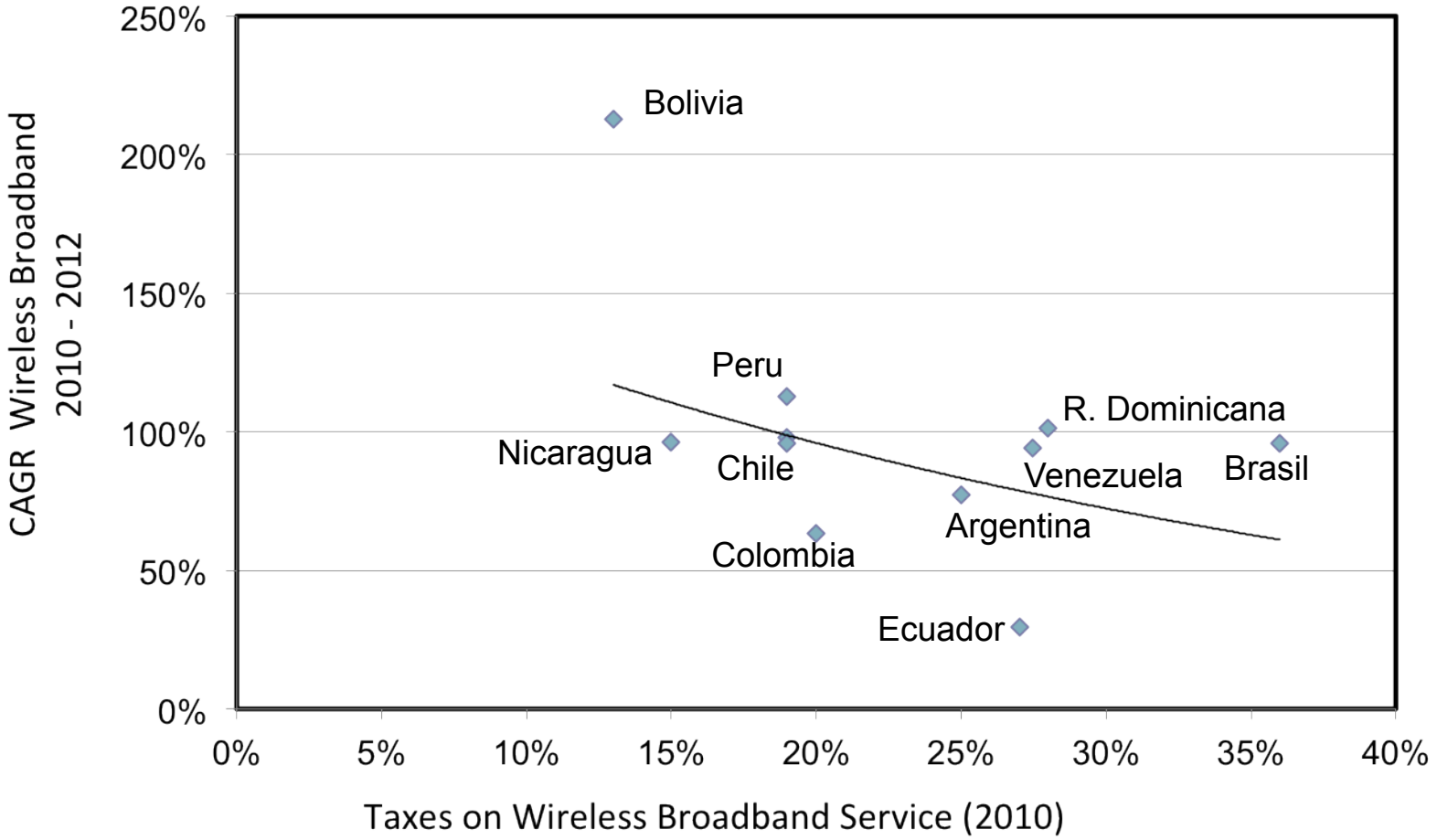
TAXATION APPROACHES TO MOBILE SERVICES

Country	Services			Handset				Taxation approach
	VAT	Other taxes	Fixed Taxes	VAT	Customs duty	Other taxes	Fixed Taxes	
Malaysia	5 %	- - -	- - -	10 %	- - -	- - -	- - -	Universalization and protectionism
South Africa	14 %	- - -	- - -	14 %	7.60 %	- - -	- - -	Protectionism
Mexico	16 %	3 %	- - -	16 %	0.10 %	- - -	- - -	Sector distortion
Brazil	18 %	3.70 %	- - -	18 %	16 %	9.30 %	$ 13.35	Tax maximization and sector distortion
Bangladesh	15 %	35 %	$ 11.76	15 %	12 %	- - -	$ 11.63	

Source: Deloitte (2008); updates by TAS

TAXES HAVE A DIRECTIONALLY NEGATIVE IMPACT ON THE OVERALL GROWTH IN PENETRATION OF WIRELESS BROADBAND

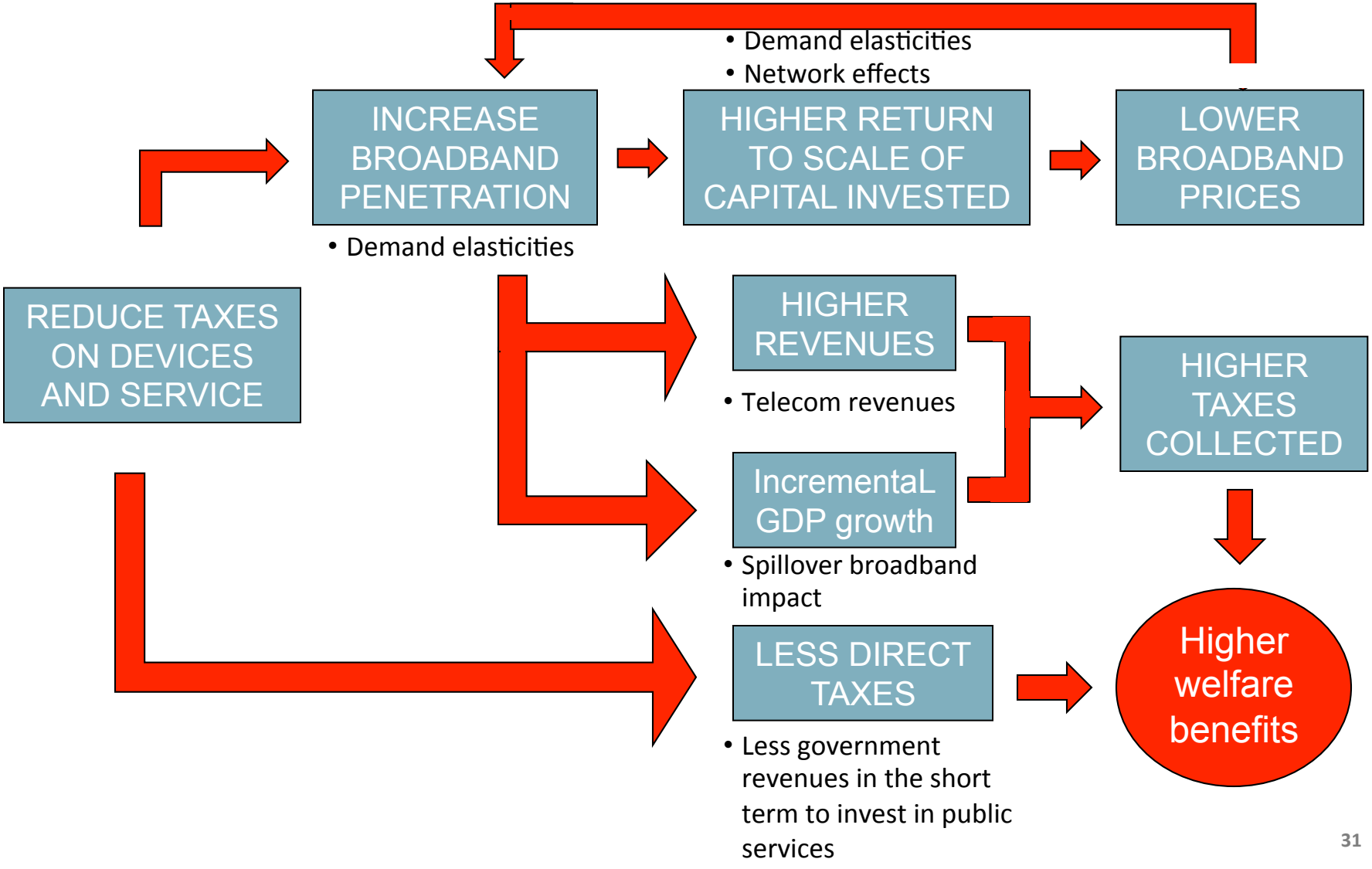
LATIN AMERICA: CORRELATION BETWEEN WIRELESS TAXES AND GROWTH RATE IN PENETRATION OF WIRELESS BROADBAND



Sources: Katz et al (2010); Wireless Intelligence; TAS analysis

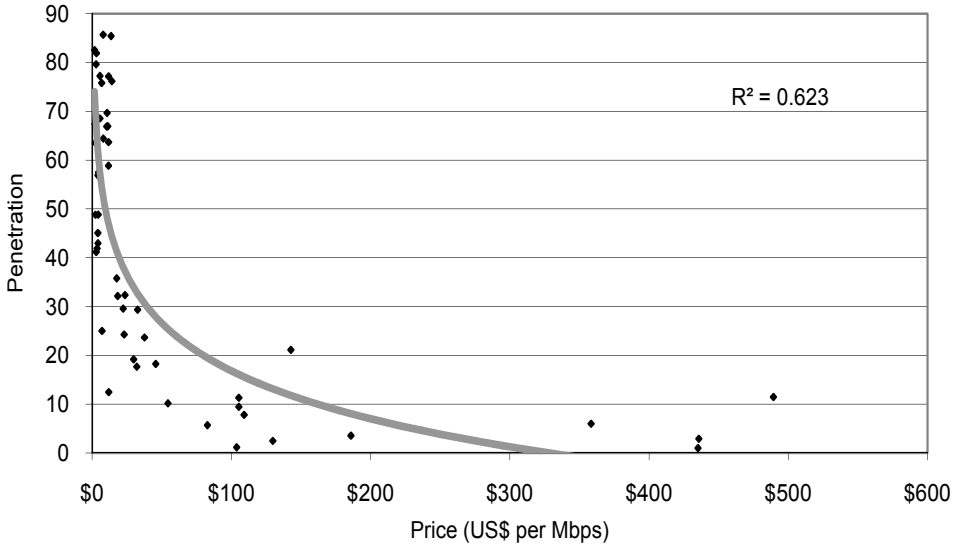
LOWERING TAXES ON CONSUMER ACCESS DEVICES AND BROADBAND SERVICE SUBSCRIPTIONS COULD HAVE A NON NEGLIGABLE IMPACT BOTH ON GDP GROWTH AND WELFARE BENEFITS

VIRTUAL CIRCLE OF TAX REDUCTION ON BROADBAND DEVICES AND EQUIPMENT



THE MACROECONOMIC AND MICROECOINOMIC EVIDENCE REVEALS THE EXISTENCE OF STRONG PRICE ELASTICITY EFFECTS IN BROADBAND

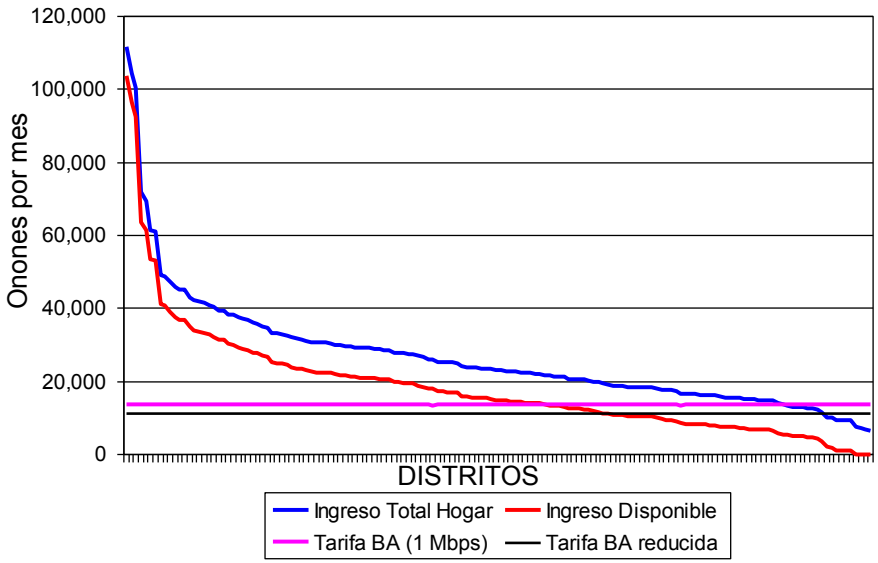
OECD Y LATAM: CORRELAtTION BETWEEN PRICE (US$ PPP/MBPS) AND BROADBAND PENETRATION



Source: Galperin and Ruzzier (2012)

- Price elasticity of fixed broadband in Latin America is 1.88 and in OECD countries es 0.53
- Accordingly, a reduction of broadband prices of 10% in Latin America would result in an increase in penetration of 19%

COSTA RICA: BROADBAND PRICE AND PENETRATION PRECIO



Source: Katz (2011)

- The income available for broadband purchasing (red line) is calculated as 5% of average income minus wireless ARPU
- At current subscription prices (red line), 69 districts of the country contain average household income that is not enough to acquire service
- If prices drop by 20% (black line), the number of districts whose average income cannot afford broadband is reduced to 51 (blue line)

LOWERING TAXES IN CERTAIN EMERGING COUNTRIES TO THE LEVEL SIMILAR OF MALAYSIA WOULD GENERATE ADDITIONAL GDP, COMPENSATING THE FOREGONE TAX REVENUES

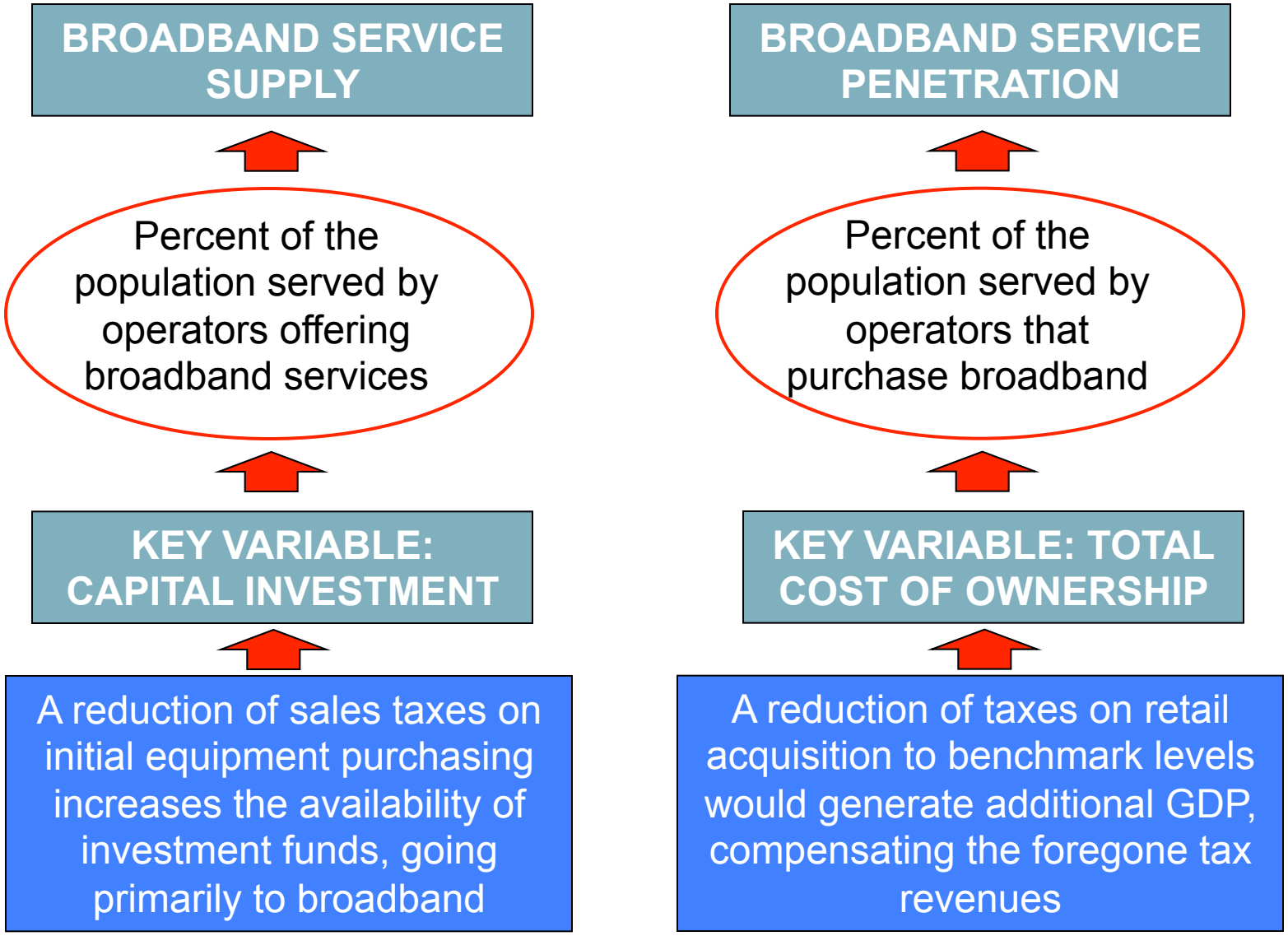
OVERALL IMPACT ON ECONOMIC WELFARE (GDP)

COUNTRY	TAXATION IMPACT ON TCO	IMPACT OF SHIFT IN TAXATION IMPACT (1)	INCREASE IN WIRELESS PENETRATION (in percentage points)	TOTAL TAX GAIN/LOSS (Billion) (2)	INCREMENTAL GDP GENERATION (Billion)
MEXICO	18.4 %	6.1%	4.6	$(0.38) - $1.7	$5.9 - $27.9
BRAZIL	43.3 %	6.1%	24.0	$2.9 - $73.1	$27.3 - $205.5
S. AFRICA	14.9 %	6.1%	9.0	$(0.34) - $2.8	$1.2 – $13.4
BANGLADESH (3)	54.8 %	6.1%	11.4	($640)	$4.9

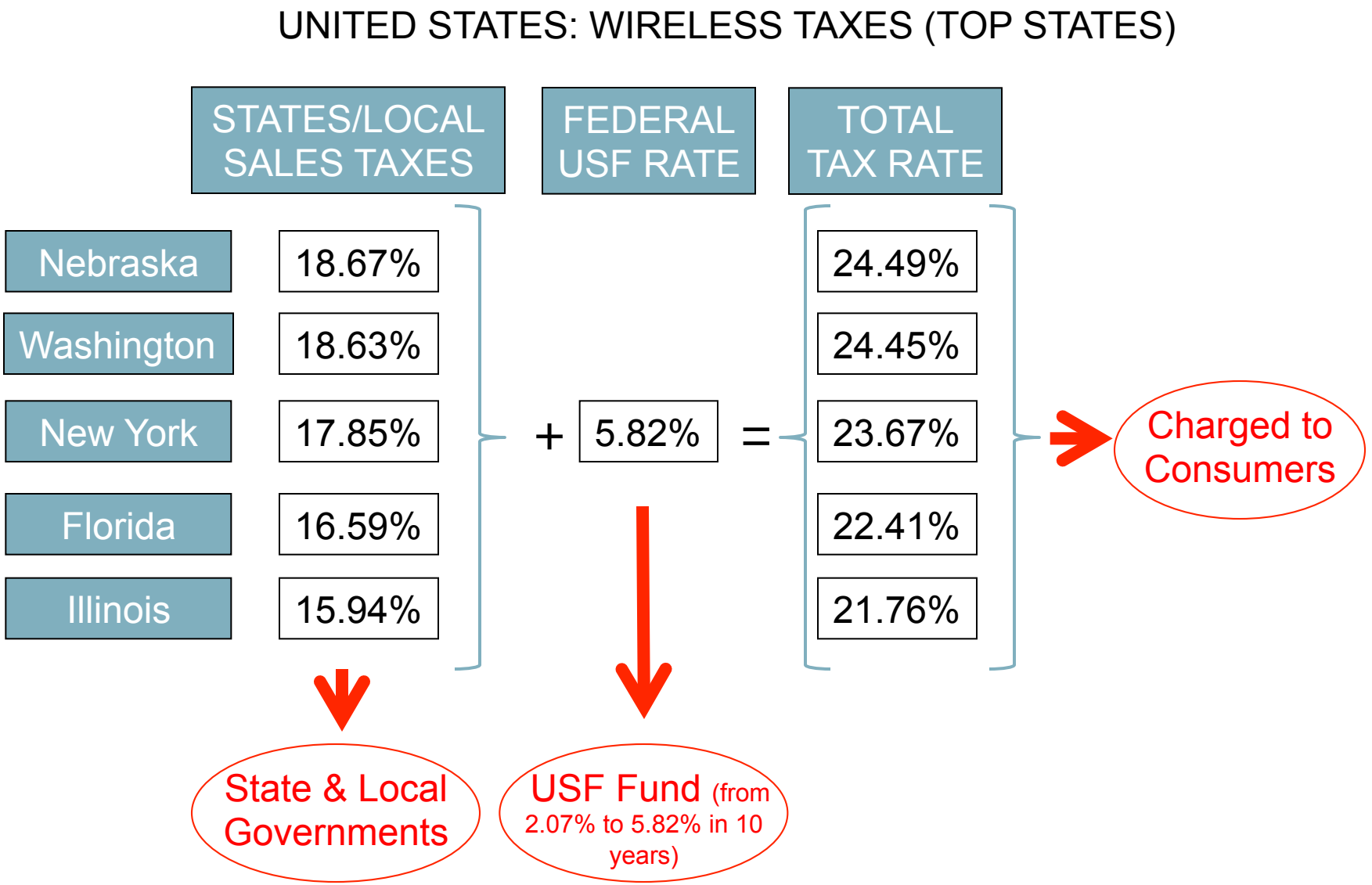
(1) Benchmark chosen as the tax rate impact on wireless services TCO in Malaysia (6.1%)
(2) The range in estimates is driven by alternative views of elasticity coefficients
(3) Lower impact reflects the initial penetration of mobile broadband in the country

Source: Telecom Advisory Services analysis

WE HAVE ALSO PROVEN THAT A REDUCTION ON TAXES AFFECTING RETAIL ADOPTION OF BROADBAND ALSO HAS A POSITIVE IMPACT ON PENETRATION



A SPECIAL CASE OF SERVICE TAXATION ENTAILS THE CONTRIBUTIONS TO THE UNIVERSAL SERVICE FUNDS



THIS POLICY NEEDS TO BE ASSESSED IN TERMS OF ITS COSTS AND BENEFITS

COSTS

- **Market distortion**
  - Limited competitive neutrality
  - Taxes affect purchasing behavior
- **Impact on lower income households**
  - Regressive nature of taxes on wireless services due to elasticity of demand
  - Negative impact on underprivileged segments

BENEFITS

- Taxes collected that could be redistributed in other public services
- Reinvestment of universal service funds in infrastructure deployment

- **Is there a potential erosion in the collected base before services are offered?**
- **Up to what point are universal service funds invested appropriately and efficiently?**

AGENDA

- The economic contribution of broadband
- The impact of taxation on broadband deployment
- The impact of taxation on broadband adoption
- Policy implications and best practices

COUNRIES NEED TO EXAMINE THEIR BROADBAND TAXATION POLICIES AND ALIGN THEM WITH ICT DEVELOPMENT OBJECTIVES

- While recognizing that sales taxes have a positive contribution to public services delivery, the economic effect of their reduction on CAPEX is significant
  - A reduction of the sales tax rate on equipment purchasing could yield an increase in investment at least proportional to a reduction of the levy
- The issues identified in the taxation of retail broadband equipment and services are not exclusively to a few countries; at least 27 countries in the emerging world have adopted distortive taxation approaches, hampering broadband penetration
  - Adopting similar taxation as Malaysia could create significant wealth with a relatively low cost to the tax collector
  - If mobile broadband is understood as a key social and economic development lever, taxes cannot represent an obstacle for diffusion
- There are clear policy inconsistencies in numerous countries, where ICT development objectives run counter to a perception that ICT firms are perceived as “cash cows”

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