ASSESSMENT OF THE ECONOMIC IMPACT OF TAXATION ON COMMUNICATIONS INVESTMENT IN THE UNITED STATES

A report to the Broadband Tax Institute

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TABLE OF CONTENTS

EXECUTIVE SUMMARY

The purpose of this study is to assess the impact of taxation on the level of investment in communications networks by the telecommunications and cable TV industries (collectively, the communications or broadband industry), as well as its economic consequences. Based on econometric analysis and statistical case studies of the impact of sales taxes on investment of both industries in the United States between 2006 and 2010, it assesses the impact that sales taxes have had on initial network equipment purchases at the national level, and in a number of specific states of the Union as case studies (California, Georgia, Maryland, Illinois, Oklahoma, Texas, and Washington). By relying on those estimates, the study projects the potential impact that a reduction or elimination of sales taxes on network equipment purchases would have both nationally and on the states analyzed as case studies.

The research literature to date provides evidence that taxes tend to raise the required pre-tax rate of return of capital invested. In general terms, leaving aside the positive effects taxes play in terms of their contribution to the delivery of public services, they tend to also affect the incentives of a company to make investments and reduce the supply of funds available to finance them. In industries such as telecommunications and cable TV that provide broadband services, a critical platform to deliver information, public services, and ensure economic growth, taxation tends to reduce the level of capital investment. For example, a decrease of 1 percentage point in the average weighted states and local sales tax rate affecting initial equipment purchasing (from 4.45% to 3.45% for cable provider network equipment and from 4.02% to 3.02% for telecommunications provider network equipment) would increase cable TV investment by $95 million and telecommunications carrier investment by $263 million per year. This would represent an additional investment of $358 million (0.85% over the current level of $42.133 billion or 1.29% over the taxable expenditure of $27.807 billion, given than 66% of total investment is spent on taxable equipment).

Furthermore, considering that 30 states impose a sales tax on wireless and wireline equipment purchasing, while 31 states (plus the District of Columbia) do so on cable TV equipment, it is reasonable to consider a scenario under which these states were to join those that have enacted policies aimed at promoting network deployment by totally eliminating this tax. This scenario would result in a baseline estimate of increase in investment of $1.48 billion, although an optimistic scenario projects the increase to reach $1.72 billion (an increase of 4.08%). This effect has been confirmed by "real life" cases such as those of the states of North Dakota and Iowa. An elimination of the sales tax on equipment in North Dakota (beginning in 2010) and a decrease from 3.00% to 1.86% in Iowa (as part of a multi-year reduction enacted in 2006) contributed to an actual telecommunications and cable TV investment increase of 207% in the former and 37% in latter.

Research indicates that the economic benefits associated with investments in communications networks are broadly distributed across the many businesses, governments, and non-profits that use information technology and communication services, as well as consumers. Those benefits comprise short-term effects resulting from network construction, and long-term effects driven by the positive externalities of communications networks, particularly broadband. By relying on input-output matrices to quantify the construction effect and econometric analysis to estimate the positive externalities, the following benefits have been estimated at a national scale. Baseline estimates indicate that an increase in investment of $1.48 billion derived from an elimination of the sales tax on equipment purchasing would:

- Generate $7.24 billion in additional annual GDP in the first year after the increase in investment and $33.13 billion of output over three years
- Create 53,000 new jobs in the first year after the increase in investment and 243,000 over three years
- Increase broadband deployment by 634,000 new connections in the short term

The sum total of the baseline economic effects is presented in table A.

Table A. Economic effects of eliminating the Sales Tax on Network Equipment

Horizon	Incremental Investment ($ Billions)	Direct Effects		Direct and Indirect Effects	
		Incremental Output ($ billions)	Jobs (000)	Incremental Output ($ billions)	Jobs (000)
Short-Term (1 year)	$1.48	$2.96	32	$7.24	53
Long-Term (3 years)	$6.77	$13.54	147	$33.13	243

Source: TAS analysis

Furthermore, the new economic activity will generate substantial offsetting revenues for state and local governments as new employment and economic activity generates income, sales, property, and other tax revenue for governments.

The economic benefits estimated for the whole country have been studied for specific states of the Union. The following table presents the economic effects if the sales tax on equipment purchases were to be eliminated for communications equipment purchases.

Table B. Economic effects of eliminating the Sales Tax on Network Equipment in Specific States

Economic Indicators	California			Georgia		
	Current	Short-run	Long-run	Current	Short-run	Long-run
GDP per capita ($K)	$ 50.90	$50.96	$51.17	$ 41.50	$ 41.53	$ 41.62
Total GDP ($B)	$1,901	$1,903	$1,911	$403	$403	$404
Unemployment Rate	10.90%	10.79%	10.55%	9.80%	9.75%	9.62%
Broadband lines (M)	21.50	21.62	22.08	5.25	5.27	5.33

Economic Indicators	Maryland			Illinois		
	Current	Short-run	Long-run	Current	Short-run	Long-run
GDP per capita ($K)	$ 51.04	$ 51.07	$ 51.16	$ 50.73	$ 50.78	$ 50.97
Total GDP ($B)	$295	$295	$296	$ 652	$ 652	$ 655
Unemployment Rate	6.50%	6.47%	6.41%	8.82%	8.74%	8.57%
Broadband lines (M)	3.46	3.47	3.50	7.16	7.19	7.33

Economic Indicators	Oklahoma			Texas		
	Current	Short-run	Long-run	Current	Short-run	Long-run
GDP per capita ($K)	$ 39.22	$ 39.27	$ 39.45	$47.81	$47.86	$48.02
Total GDP ($B)	$148	$148	$148	$1,207	$1,209	$1,213
Unemployment Rate	6.10%	6.03%	5.88%	7.10%	7.04%	6.91%
Broadband lines (M)	2.00	2.01	2.05	14.48	14.55	14.81

Economic Indicators	Washington		
	Current	Short-run	Long-run
GDP per capita ($K)	$ 50.48	$ 50.54	$ 50.74
Total GDP ($B)	$340	$341	$342
Unemployment Rate	8.30%	8.22%	8.04%
Broadband lines (M)	4.01	4.03	4.11

1. INTRODUCTION

The purpose of this study is to assess the impact of taxation on the level of investment in communications networks and its economic consequences. It is based on econometric analyses and statistical case studies of the impact of sales taxes on telecommunications and cable TV provider investment in the United States between 2006 and 2010. On this basis, it assesses the impact that sales taxes have on initial communications equipment purchases in specific states that have been analyzed as case studies (California, Georgia, Maryland, Illinois, Oklahoma, Texas, and Washington). By relying on those estimates, it projects the potential impact that a reduction of sales taxes would have both nationally and on the specific case study states.

The study's underlying logic is that the deployment of communications infrastructure requires the investment in equipment and outside plant, from fiber optics to electronics. Telecommunications carriers and cable TV companies may be subject to sales taxes on initial purchase of equipment, which are defined by state and local laws. These levies increase the cost of deploying infrastructure and consequently have the potential of reducing the amount of capital geared for deploying communications networks, in particular broadband infrastructure. Since communications have been proven to contribute to economic growth and job creation, a lesser amount of investment, caused by sales taxes on investment, has the potential to reduce their economic impact. In this context, this study will provide the quantitative evidence of the negative economic impact of taxation of equipment purchasing on companies investing in communications infrastructure. On this basis, it will model what the expected impact would be if the existing levels of taxation were to be reduced.

Chapter 2 reviews the research literature regarding the impact of taxation on corporate investment. While emphasizing that a rise in the tax rate in an open economy causes a net capital outflow, and negative economic welfare, the research also tends to emphasize the complex mechanisms by which taxes tend to affect investment. Among the different variables highlighted, we review the varying impact of taxes on investment depending on the state of the economy, the importance of inertia of past capital planning decisions as a driver of future investment decisions, and the competitive impact that taxes might have in attracting future investment from one state to another.

Chapter 3 provides evidence of how taxation is affecting communications network investment levels in the US. Focusing on sales taxes on initial equipment purchasing by the three industries mentioned above, we first review the current situation in terms of the weighted state and local sales taxes by state. On this basis, an econometric model is developed to explain the inverse causality between sales taxes and investment. The robustness tests of such models are included in appendix A. The third body of evidence included in this chapter comprises case studies based on the analysis of longitudinal data of sales taxes and investment for those states that have aggressively reduced rates in the past years (e.g. North Dakota, and Iowa), or have increased them (e.g. South Carolina and Massachusetts).

Having proven the inverse causality between sales taxes on equipment purchasing and investment, we move to determine the social and economic impact that a reduction of taxation might have. Chapter 4 reviews the research literature on the impact of communications networks on economic growth and job creation, underlining both the short-term effects of network deployment and the long-term impact through positive externalities and spill-over effects on industries beyond telecommunications and cable TV providers.

With the review of the literature on economic effects as a background, Chapter 5 presents the estimates of alternative scenarios regarding the reduction of sales taxes on equipment purchasing of the telecommunications and cable TV industries. The simulations are based on impact models constructed for the national economy, calculating the impact coefficients for economic growth, job creation, and broadband penetration.

Finally, the econometric models presented in Chapters 3 and 5 are utilized to estimate what the economic impact would be if an exemption of communications network equipment purchases from state and local sales taxes were enacted in California (chapter 6), Georgia (chapter 7), Maryland (chapter 8), Illinois (chapter 9), Oklahoma (chapter 10), Texas (chapter 11), and Washington State (chapter 12).

2. PRIOR EVIDENCE OF IMPACT OF TAXATION ON INVESTMENT: A REVIEW OF THE LITERATURE

The research literature tends to concur that a rise in the tax rate in an open economy causes a net capital outflow, and negative economic welfare. Since taxes tend to raise the required pre-tax rate of return of capital invested, the aggregate capital stock in a given economy depends on the effective tax rate. As Devereux (2006) states,

> "(If a) company should invest up to the point at which the marginal product of capital equals the cost of capital (…) the impact of taxation should be measured by the influence of (an effective marginal tax rate) on the cost of capital"

In general terms, most research literature has found that taxation regimes play an important role in driving capital flows, when controlling for economic development, unemployment and currency fluctuations (Slemrod, 1990; Devereux and Freeman, 1995; Jun, 1994; Billington, 1999). Accordingly, when a firm has to make an investment decision, taxation plays a significant role. As stated by Lintner (1954), taxes affect both the incentives of a company to make investments and reduce the supply of funds available to finance them. As a result, several empirical studies indicate that marginal and average tax rates have a negative effect on investment decisions.

Since investment is one of the engines of long-term economic growth, taxation plays a direct role in this equation. Talpos and Vancu (2009) showed that a reduction of corporate income taxation determines, over time, an increase in the level of gross fixed capital formation. The authors also found this effect to be more important in emerging economies, where investment is more needed.

However, taxes are just one of the many factors driving capital investment decisions. Beatty et al. (1997) show that high net equity financing activity (access to low cost funds) and high stock returns (market signaling) are also important in explaining high future net capital expenditures. Similarly, as expected, the authors found that high net income and low dividend payouts are important predictors. Nevertheless, when controlling for these factors, the authors also found that changes in the tax code in 1986 had a real effect on the investment behavior of US-based firms.

In general terms, Lintner (1954) also found that in periods of economic expansion, the negative impact of taxation on investment affects primarily the supply of funds and not the incentives to invest. He also states that,

> "So long as profit positions are not unacceptably low and the necessary funds are available, very substantial amounts of new investment will be undertaken even where there is no very clear enough evidence that the individual investment moves will add enough to net profit to make them worthwhile".

The incentives mentioned include maintaining or improving a company's competitive position, or increasing market share. Conversely, in periods of economic downturn, the effects of taxes on investment incentives would be relatively more important, and the availability of funds becomes less important in influencing investment decisions.

The mechanisms by which taxes affect telecom investment are fairly complex. Devereux (2006) considers that taxation first affects two binary decisions: **which business** to invest (e.g. wireless, broadband, other) and **which geographic location** to invest (e.g. a specific state). In addition, taxes also influence a continuous choice: once a business and locations are agreed upon based on taxation attractiveness, businesses see levies affecting their capital expenditure allocation process (in other words, taxes will influence **how much** will investment favor certain states to the detriment of others?).

It should be noted that changes in tax regimes do not affect investment decisions instantaneously. Investment decisions are partially driven by variables that only change gradually (e.g. changes in the cost of capital). As a result, a modification of taxation regimes (e.g. a change in the sales tax rate affecting the initial purchasing of equipment) might affect the incentives to invest immediately, but translate in investment decisions only gradually (Auerbach, 2005).

This condition is even more acute in capital-intensive industries such as communications. Typical capital planning processes in communications comprise decisions in three domains: maintenance of existing plant (e.g. replacement of depreciated equipment), network modernization (e.g. deployment of 4G networks, deployment of fiber in the access network, deployment of DOCSIS 3.0), and capacity upgrades (e.g. investment to accommodate growth in demand). Each investment domain is driven by different time constraints. For example, maintenance capital investment is typically multi-year and mostly non-discretionary; therefore, it is largely predictable and relatively less subject to taxation effects. Network modernization capital, while also being multi-year, could be affected by capital allocation decisions influenced by taxation (in other words, if taxation reduces the supply of funds, it could impact investment thereby affecting the rate of modernization). On the other hand, capacity upgrades have a long-term component driven by demand forecast, but also a very short-term component focused on surgical infrastructure upgrades (e.g. accommodate spikes in demand in certain portions of the network). This area of capital investment might be less affected by taxation regimes since it is directly linked to revenue generation opportunities.

Based on these considerations, studying the impact of taxation on communications network investment will have to consider several premises. When constructing econometric models that explain the evolution of communications network investment, it is critical to incorporate control variables that go beyond the measurement of changes in taxation regimes. Since investment levels are more affected by taxation regimes during recessionary periods, it will be important to consider variables measuring the performance of the economy. Likewise, given that investment is driven, to a large degree, by the imperative to capture market potential, it is critical to include variables and/or proxies for variables reflecting the nature of the business opportunity. Finally, while the models to be developed to explain communications investment rely on a single dependent variable (industry investment across the wireline, wireless, and cable sectors), this metric subsumes, as mentioned above, a number of management and capital planning allocation decisions, each one being influenced by specific conditions of taxation regimes. In that sense, it is critical to develop methodologies that accommodate the inertia of budgetary processes, whereby future capital investments can be, to some degree, determined by the level of investment in prior years.

3. THE IMPACT OF TAXATION ON TELECOMMUNICATIONS AND CABLE TV PROVIDER INVESTMENT IN THE UNITED STATES

3.1. Current level of investment and sales tax rate on initial equipment purchasing:

Telecommunications and cable TV investment in 2010 in the United States by the communications companies who provided data for this analysis reached $42.133 billion, averaging $137.12 per capita. This figure represents the sum of the four major telecommunications carriers (ATT, Verizon, Sprint, and Qwest) as well as almost all cable TV operators[1]. The industry estimates that about 66% of all investment expenditures ($27.808 billion or an average of $90.50 per capita) are on equipment subject to the sales tax, with the remaining 34% spent on labor, permitting, and other non-taxable services. When looking at the communications investment per capita over

[1] It is estimated that this figure represents approximately 80% of the investment of telecommunications carriers and nearly all the cable TV industry (source: Broadband Tax Institute).

time between 2006 and 2010, one notices a wide variance across states and over time (see table 1).

Table 1. Evolution of Communications 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
States std. dev.	$ 46.15	$ 38.76	$ 38.94	$ 43.01	$ 60.58	$ 46.23
Minimum	$ 17.03	$ 38.60	$ 29.49	$ 28.39	$ 35.84	$ 17.03
Maximum	$ 243.57	$ 192.56	$ 214.68	$ 229.50	$ 447.44	$ 447.44

Source: TAS analysis

While it is obvious that conventional variables such as market potential and competitive imperative drive investment intensity, based on the research literature reviewed above, it is pertinent to raise the question as to what is the role of taxation in influencing investment.

In 2010, the simple five-year average sales tax rate on initial equipment purchase for the cable TV industry was 4.45%, while the five-year average rate for wireless and wireline providers was 4.02%. This represents a total tax contribution of $ 1.394 billion (on average the 66% of equipment purchasing is being affected by the sales tax in the states that have no exemption). The five-year average sales tax on wireless and wireline initial equipment purchasing is relatively stable (around 3.98%), exhibiting an increasing standard deviation across states over time (see table 2).

Table 2. Evolution of US Sales Tax on Wireless and Wireline investment (2006-2010)

Year	2006	2007	2008	2009	2010
Mean	3.88%	3.94%	3.96%	4.12%	4.02%
Max.	9.25%	9.25%	9.25%	9.25%	9.25%
Standard deviation	3.50%	3.55%	3.58%	3.60%	3.67%
States without taxes	20	20	20	19	20

Source: TAS analysis

In the case of cable TV equipment, the average sales tax affecting equipment purchasing has been increasing over time, reaching 4.45% in 2010 (see table 3).

Table 3. Evolution of US Sales Tax on Cable TV investment (2006-2010)

Year	2006	2007	2008	2009	2010
Mean	4.14%	4.20%	4.23%	4.42%	4.45%
Max.	9.25%	9.25%	9.25%	9.25%	9.25%
Standard deviation	3.55%	3.58%	3.60%	3.62%	3.65%
States without taxes	20	20	20	19	19

Source: TAS analysis

One should also note that taxation on initial equipment purchase does not represent a homogeneous fiscal policy across the nation. Twenty states (plus the District of Columbia) do not tax telecommunications provider network equipment, while nineteen do not do so in the cable TV provider case.[2]

3.2. Model explaining the impact of sales tax rate on investment by Cable TV and telecommunications companies:

An econometric model was built to test the impact of sales taxes on telecommunications and cable TV investment. Considering that the telecommunications and cable TV industries enjoy different tax exemptions by state, and that changes in the tax regime affect each industry differently, the model was specified for the telecommunications and cable TV industries separately. In general, the model estimates the impact of different tax rates among states and years, controlling for states' fixed effects, such as wealth of the economy, demographic profile, and urban/rural population, variables considered to be proxies for fixed effects. In addition, the model includes a control variable lagged one year to account for the effect of budgeting inertia in investment decisions[3].

The model for assessing the impact of sales taxes on investment is structured as follows:

$$\text{Taxable Investment PC}_{it} = \alpha_1 (\text{Equipment State Sales Tax}_{it}) + \alpha_2 (\text{Median Income}_{it}) + \alpha_3 (\text{Population}_{it}) + \alpha_4 (\text{Human Capital}_{it}) + \alpha_5 (\text{Rural Population}_{it}) + \alpha_6 (\text{Investment PC}_{it-1}) + \alpha_7 (\text{Population 60 years or more}_{it}) + \alpha_8 (\text{Population between 20/34 years}_{it}) + \alpha_9 (\text{Population between 5/19 years}_{it}) + e_{it}$$

The variables considered are the following (see table 4):

[2] The states that do not impose sales and use tax telecommunications network purchases are: AZ, CT, DC, DE, HI, IN, MI, MN, MO, MS, MT, NC, ND, NH, NJ, NY, OH, OR, PA, UT, and WV. The states that do not impose sales and use tax cable network equipment purchases are: AK, AL, CT, DE, IN, MA, MN, MT, NC, NH, NJ, NM, OK, OH, OR, PA, SC, VA, and WV.

[3] In other words, it accounts for the importance of the prior year in predicting investment in the current year, an effect observed above in the review of the research literature on capital planning.

Table 4. Variables of Sales Taxes Effect on Investment

Variable	Explanation	Rationale	Source
State communications investment per capita	Sum of taxable state investment by operators per capita in 2010 dollars (66% of the total investment)	Total state communications investment normalized by population size	Broadband Tax Institute
State sales tax rate on initial equipment	Effective sales tax rate on cable or telecom	Independent variable	Mackey (2011)
Median Income	State Median Income	Control variable given that the level of income impact on investment	US Bureau of Economic Analysis
Population	Population at state level	Control variable	US Bureau of Economic Analysis
Human Capital	Share of economically active population with at least High School education	Control variable given that more educated population drives demand	National Broadband Plan Database (FCC)
Rural Population	Share of rural households at the state level	Control variable given that rural population should be inversely related with broadband deployment	US Census Bureau
State communications investment per capita lagged	Sum of state investment by cable TV or telecom operators per capita one year before (in 2010 dollars)	Control for investment inertia	Broadband Tax Institute
Population 60 years or more	Share of population with 60 years or more	Control for age of the population	National Broadband Plan Database (FCC)
Population between 20/34 years	Share of population between 20 and 34 years	Control for age of the population	National Broadband Plan Database (FCC)
Population between 5/19 years	Share of population between 5 and 19 years	Control for age of the population	National Broadband Plan Database (FCC)

Source: TAS analysis

Model results for the telecom and cable TV industries are presented in the following table.

Table 5. Model of Impact of Sales Tax Rate on Investment

OLS Model of Impact of Sales Tax Rate on Investment with autoregressive factor (2006-2010)				
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

Note: The median income coefficient is estimated over $1,000 multiple

Source: TAS analysis

The coefficient for the sales tax rate variable indicates that a decrease of 1 percentage point in this rate (for example, from 4.45% to 3.45% in cable TV and from 4.02% to 3.02% in wireless and wireline equipment) would increase cable TV investment by $0.31 per capita and wireline & wireless investment by $0.85 per capita across all states. These results are statistically significant at the 6% level for cable TV investment and

10% for wireless and wireline. Furthermore, the coefficients imply an elasticity of investment per capita due to a change in sales tax rate, which is calculated as follows:

$$Elasticity\ of\ inv.\ p.c. = \frac{(-0.3085 * Old\ average\ sales\ tax)}{Average\ investment\ per\ capita}$$

Or,

$$0.0408 = \frac{(-0.3085 * 4.45)}{Average\ investment\ per\ capita}$$

As the models indicate, the investment in telecommunications is sensitive to sales taxes; every decrease of 1% in the average sales tax rate results in an increase in the total cable TV per capita investment of 0.0408% and 0.0332% in wireline and wireless per capita investment[4]. These elasticity coefficients allow for the calculation of the impact on investment per capita of alternative tax rate scenarios. For example, a decrease in the cable sales tax rate affecting initial equipment purchase from an average 4.45% to 3.00% (a rate reduction of 33%) would yield an increase in cable investment per capita of $0.45 (1.33% over the current investment per capita). The same change in sales tax target level for line/wireless per capita would yield an increase of $0.87 per capita (0.84% over the current investment per capita).

Similarly, a total elimination of the sales tax affecting the purchase of equipment for both telecommunications and cable TV companies would generate an increase in investment of $1.37 per capita for cable TV operators and $3.43 per capita for wireless and wireline companies. This would result in a total baseline increase of $1.48 billion from a base of $42.1 billion[5].

3.3. **Impact of sales tax rate on investment by Cable TV and telecommunications companies in specific states**

The impact of a reduction or an increase of the sales tax rate on equipment purchasing can also be assessed by examining the actual investment behavior incurred by telecommunications carriers and cable TV operators in states that enacted such policies. The following analysis identifies those states that have most significantly reduced or increased their average sales tax rate on initial equipment purchase between 2006 and 2010 and measures any changes in investment levels. Table 6 ranks states by the range of variation in sales tax rate for investment by wireless and wireline carriers between 2006 and 2010.

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[4] The elasticity coefficients in relationship with the taxable investment, 66% of the total investment, are 0.0619 and 0.0504

[5] The baseline estimate assumes that the cable TV and telecommunications industries react to the elimination of the sales tax according to the coefficients of increased investment calculated for each sector for the data between 2006 and 2010. If both industries were to increase their investment according to the elasticity of cable TV (0.0631), an optimistic scenario, the incremental investment would reach $2.66 billion.

Table 6. Variation on Sales Tax Rate on Telecommunications Investment 2006-2010

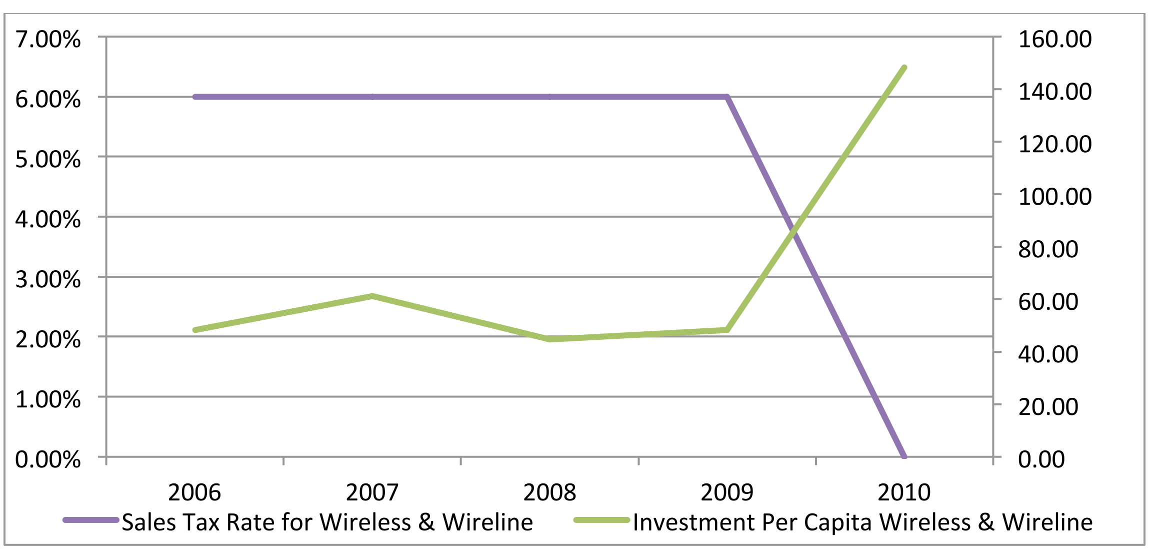
State Name	Variation on Sales Tax Rate on Wireless & Wireline 2006-2010
North Dakota	-100.00%
Iowa	-60.61%
Florida	3.57%
Illinois	4.42%
Washington	4.65%
New Mexico	4.83%
Nevada	6.32%
Georgia	7.14%
Vermont	8.33%
Kansas	10.16%
California	14.20%
South Carolina	16.00%
Idaho	20.00%
Maryland	20.00%
Massachusetts	25.00%

Source: TAS analysis from Broadband Tax Institute and Tax Foundation data

As indicated in table 6, the top two states that enacted a policy leading to a significant reduction in sales tax rate on telecommunications and cable TV equipment purchasing were North Dakota and Iowa. North Dakota adopted a sales tax exemption for communications equipment in the 2009 session that impacted 2010 investment. Iowa adopted a six-year phase-out of the sales tax on network equipment purchases beginning in July 1, 2006 and ending with a full exemption effective on July 1, 2012.

As expected, a reduction of the sales tax rate in North Dakota contributed to a major increase in the level of investment (see figure 1).

Figure 1. Evolution of investment and sales tax rate in North Dakota 2006-2010



Source: TAS analysis

As figure 1 indicates, the sales tax rate on equipment purchasing in North Dakota before 2010 averaged 6.00%, which was higher than the national average. On the other hand, the level of wireless and wireline investment per capita approximated $48.33 per capita, with little variance over time[6].

In 2010, the sales tax rate on initial equipment purchasing was eliminated and the level of wireless and wireline investment increased three-fold in just one year, reaching $148.30 per capita. As this number indicates, the effect of a reduction in taxation on the level of investment is higher than the impact that was estimated in the econometric model in section 3.2. According to the model, a reduction of taxation of this magnitude should have yielded an increase in the level of investment of $5.12 rather than the actual $99.97. This prompts three observations. First, the impact econometric model may generate a conservative estimate of an increase in investment as a result of a reduction in taxation. According to an optimistic scenario, which applies the cable elasticity coefficient (0.0408 calculated in page 17) to the wireless and wireline behavior, investment should increase $6.29 per capita.

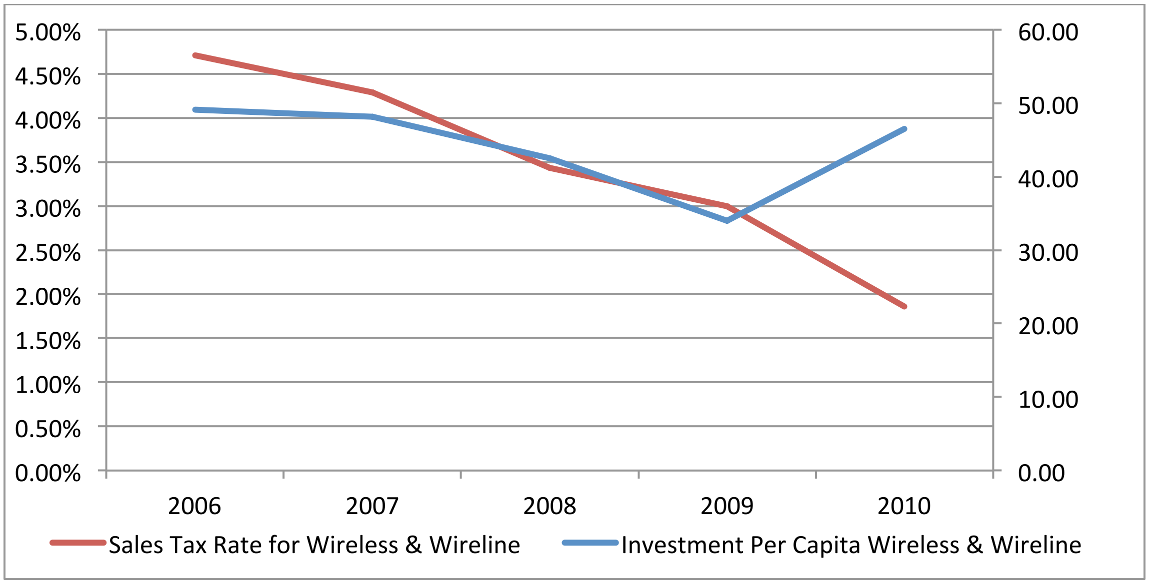
Second, the significant effect of the North Dakota case study could be understood with the help of the framework developed by Devereux (2006) and discussed in chapter 2. The capital planning of a multi-state business follows a series of sequential decisions, starting from which states and business to invest in to the magnitude of the investment in each of them. When a state legislature votes to eliminate sales taxes on equipment purchasing, it sends a signal to operators regarding the intrinsic attractiveness of conducting business in that particular state. In the decision of how much capital investment will favor certain states to the detriment of others, the operators subsume two different reactions. The first one refers to the supply of funds decision, which means that "dollar for dollar", the money saved in taxes flows to investment. The second one is what Lintner (1992) calls the incentive reaction, whereby funds that could have been invested in other states, now tend to flow to the state that has reduced its sales taxes. In addition, since sales taxes on equipment can affect the return on a certain investment (such as for example, broadband networks), a reduction in taxation could make some projects that were not attractive before the reduction become profitable after the measure is enacted. These factors translate into an incentive to spend more than what is saved in taxes.

Third, the magnitude of the investment increase suggests that other non-tax factors may have been involved in North Dakota. Companies may have shifted the timing of planned investment to receive the benefit of elimination of the tax on the investment. An effect of this magnitude suggests that an additional examination of years beyond 2010 may be necessary to fully explore the impact of the tax reduction. More importantly, a significant increase of activity in the oil industry in the state is also having an impact on telecommunications investment.

A similar effect is observed in Iowa, which shows a progressive sales tax reduction from 4.71% to 1.86% between 2006 and 2010 (see figure 2).

[6] This amount ranked North Dakota in 50th position among states of the Union.

Figure 2. Evolution of investment and sales tax rate in Iowa 2006-2010



Source: TAS analysis

In this case, the effect of a sales tax reduction on wireless and wireline investment was less accentuated than in North Dakota. We first observe that a reduction of the rate between 2006 and 2009 did not result in an increase in investment. This could be because the rate reduction in Iowa was not as significant as in the prior case study (6 percentage point reduction in North Dakota versus an average decline of 0.57 points over three years). This could imply that for a reduction in sales taxes to have an impact on investment levels, the decline has to be quite significant.

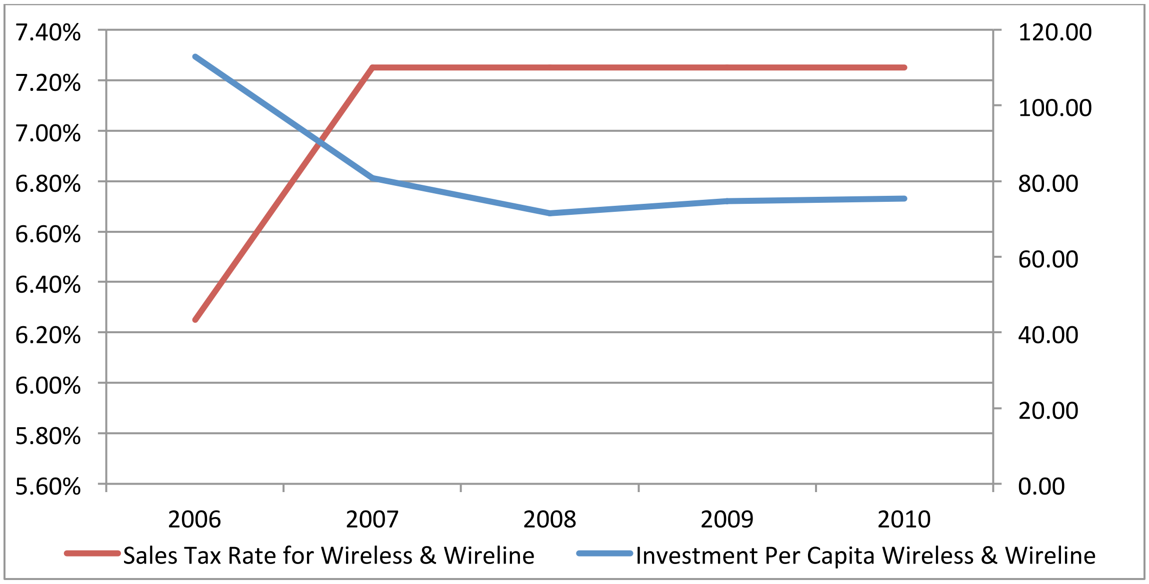
The second reason why a decline in sales tax rate did not yield an increase in investment could be related to the impact of the economic recession. Relating this back to Lintner's argument (1954) cited above, at times of recession, investment stimulation could only result from a significant reduction in taxation.

On the other hand, the reduction in 2010 (from 3.00% to 1.86%) finally yields an uptick in investment, raising investment per capita from $33.99 to $46.47 (37% more than in 2009). One explanation for this effect could be that by 2010, the cumulative effect of yearly decreases had reached a point where the wireless and wireline industries could confidently increase their level of investment.

In addition to assessing the positive impact of a decrease in sales taxes, we analyzed the examples of South Carolina and Massachusetts, two states which raised the tax rate in the last five years, thereby resulting in a negative impact on telecommunications investment.[7]

[7] While Idaho and Maryland also increased their sales tax rate, they previously had a lower rate than South Carolina.

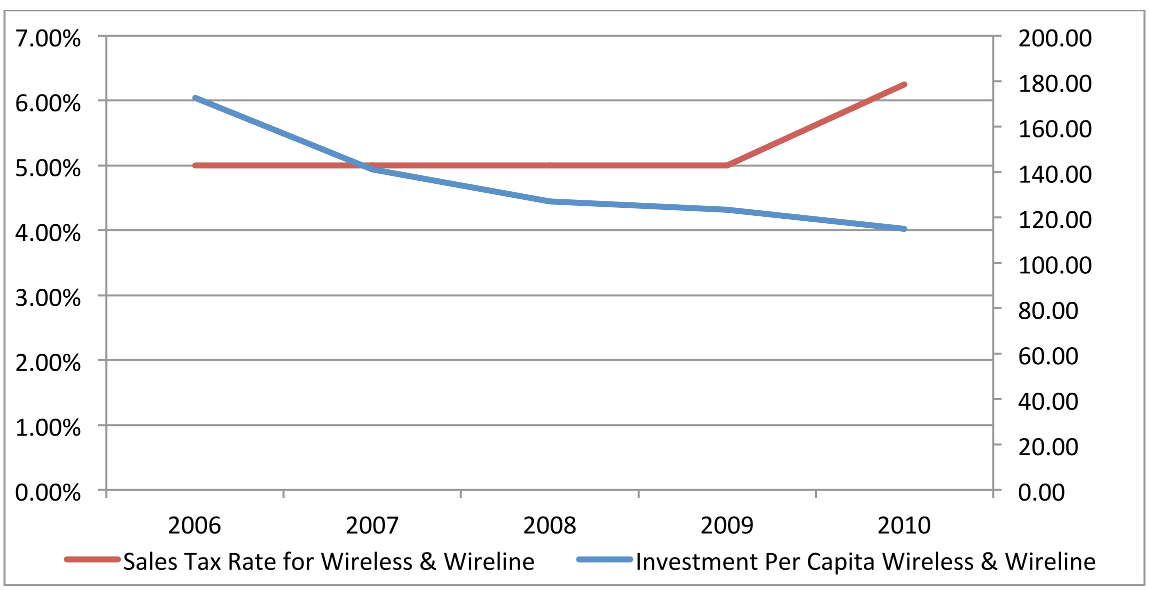
Figure 3. Evolution of investment and sales tax rate in South Carolina 2006-2010



Source: TAS analysis

In South Carolina, the sales tax rate was increased significantly between 2006 and 2007, from 6.25% to 7.25%. In this case, the increase in the sales tax rate resulted in a large contraction in the level of investment per capita, which decreased 33%, from $115.37 to $77.44 per capita.

Figure 4. Evolution of investment and sales tax rate in Massachusetts 2006-2010



Source: TAS analysis

In Massachusetts, a 25% increase in the sales tax rate (from 5.00% to 6.25% in 2010) resulted in a reduction in investment between 2009 and 2010 even though, nationally, mean per capita investment increased by over 18%, from $76.57 to $90.50.

A similar analysis was attempted for the case of cable TV investment. However, as Table 7 indicates below, there are no states that have enacted as dramatic a reduction in the sales tax on network equipment for cable providers, as was the case for telecommunications operators.

Table 7. Variation on Sales Tax Rate on Cable Investment 2006-2010

State Name	Variation on Sales Tax Rate on Cable 2006-2010
Tennessee	-9.32%
Nevada	-5.58%
Wyoming	-2.45%
Idaho	0.50%
Wisconsin	0.74%
Washington	1.41%
North Dakota	3.89%
Louisiana	4.45%
Texas	7.18%
Arkansas	7.86%
Florida	8.22%
South Dakota	8.75%
Illinois	8.87%
Iowa	15.32%
Kansas	16.57%
California	17.16%
Maryland	20.00%

Source: TAS analysis

As a result, it was not possible to replicate for the cable TV industry the case studies conducted in wireless and wireline[8].

4. RESEARCH EVIDENCE OF THE ECONOMIC IMPACT OF TELECOMMUNICATIONS

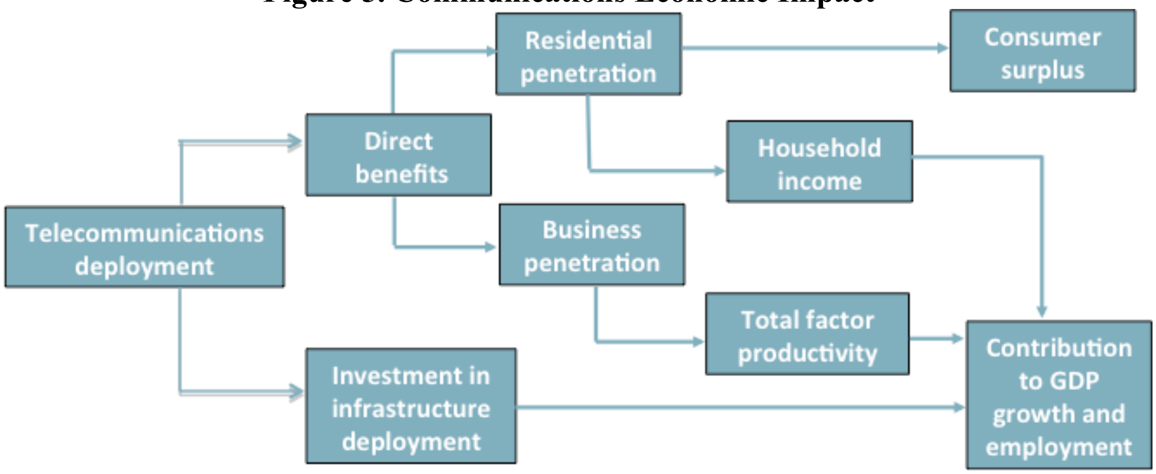
If sales taxes reduce communications investment (as we have shown above), and communications have a positive contribution to economic growth and job creation, it stands to reason that a reduction of investment resulting from sales taxes should have a

[8] It should be noted, however, that in order to generate estimates for the cable industry, we relied on the difference between states, and the marginal differences between years to specify the model results.

negative economic impact. The following chapter will review the evidence generated so far regarding the positive socio-economic impact of communication networks.

Communications has been found to have multiple economic impacts, ranging from the growth of output, to job creation and consumer surplus (see figure 5).

Figure 5. Communications Economic Impact

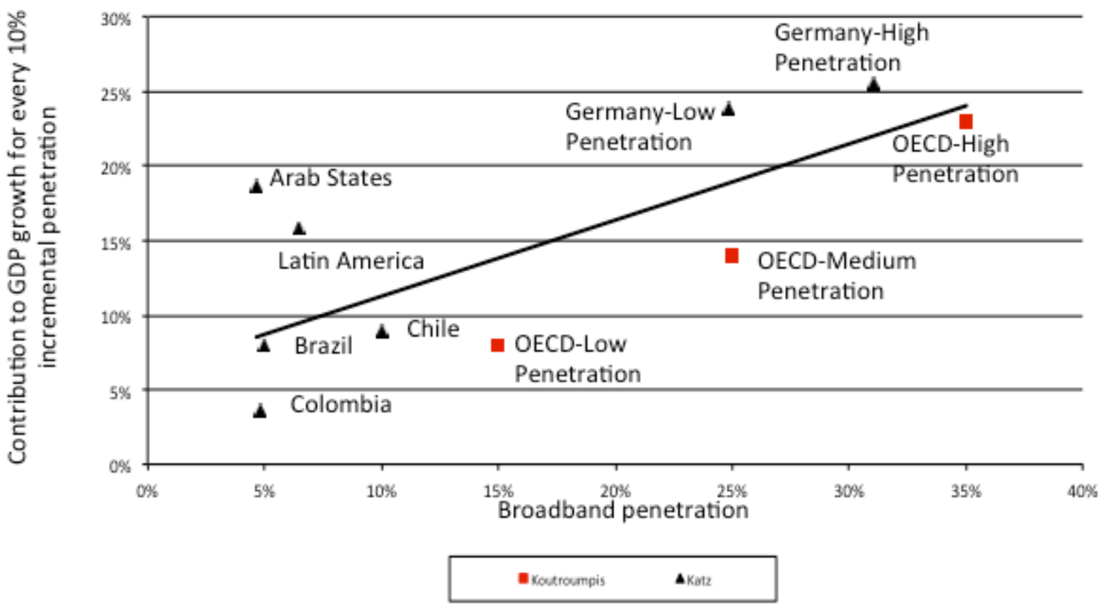


Source: TAS analysis

The first effect results from the construction of communications networks. In a way similar to any infrastructure project, the deployment of networks creates jobs and acts over the economy by means of multipliers. The second effect results from the "spill-over" externalities, which impact both enterprises and consumers. The adoption of communications within firms leads to a multifactor productivity gain, which in turn contributes to growth of GDP. On the other hand, residential adoption drives an increase in household real income as a function of a multiplier. Beyond these direct benefits, which contribute to GDP growth, residential users receive a benefit in terms of consumer surplus, defined as the difference between what they would be willing to pay for communications service and its actual price. This last parameter, while not being captured in the GDP statistics, can be significant, insofar that it represents benefits in terms of enhanced access to information, entertainment and public services.

Along these lines, numerous studies have pointed out the contribution that broadband has to economic growth. In fact, the evidence indicates that this impact increases with penetration, an effect that has been labeled in the literature "increasing returns to scale". Figure 6 depicts this effect by compiling the numerous studies conducted to measure the increasing economic impact of broadband.

Figure 6. Broadband Penetration versus Broadband Contribution to GDP



Source: TAS analysis

Furthermore, broadband has also been found to have a positive impact on job creation, as indicated by numerous studies (see table 8).

Table 8. Broadband impact on Job creation

Study	Region/Country	Impact on job creation for each 1% increase in rate of growth of broadband penetration		Observations
		Employment	Unemployment	
Shideler *et al.* (2007)	Kentucky, USA	0.14-5.32		• Statistically significant level at 1% (total employment) • 114 observations (total).
Katz *et al.* (2010)	High developed counties in Germany	0.0061		• Statistically significant level at 1% • 214 observations
Katz et al. (2010)	Sub-urban counties in Kentucky		- 0.371	• Statistically significant level at 1%
Katz (2011)	Brazil		-0.0449	• Statistically significant coefficient (t-statistic=1.73) • 27 observations
	Chile	0.181		• Statistically significant coefficient (t-statistic = 3.85) • 324 observations
	Dominican Republic		-0.2952	• Statistically significant coefficient (t-statistic = -2.22) • 32 observations
Katz et al. (2012)	Colombia	0.0062		• Statistically significant level at 5% • 132 observations

Source: TAS analysis

To sum up, the review of the literature of communications economic impact concludes that the impact of reduced taxation proceeds along two paths. On one hand, a reduction in taxation would result in an increase in communications investment, with the consequent effect in network construction employment and output. This effect comprises: a) additional direct jobs and output (defined as employment and economic production generated in the short term in the course of deployment of network facilities), b) indirect jobs and output (understood as employment and production generated by indirect spending in industrial sectors such as metal products, and electrical equipment), and c) induced jobs and output (which results from household spending based on the income earned from direct and indirect effects). On the other hand, once additional networks are being deployed, they yield enhanced positive externalities in terms of spillover effects on GDP and employment.

5. ESTIMATE OF ECONOMIC IMPACT OF LOWERING TAXES ON TELECOMMUNICATIONS AND CABLE TV INVESTMENT IN THE US

In order to estimate the economic impact of reduced taxation at the national level, it is necessary to define what the additional investment in communications would be as a result of alternative taxation scenarios. Once these scenarios are defined and the additional investment is calculated based on the econometric models specified in section 3, the impact of the increased investment on employment and output can be calculated.

5.1. Defining alternative taxation scenarios

To estimate the impact of investment on employment and GDP, we defined three scenarios of how the cable TV and wireless/wireline industries would react to a change in sales tax rate. Each scenario is defined on the basis of the elasticity coefficients estimated based on the econometric models specified in section 3.2. The baseline scenario stipulates that both the cable TV and the wireless/wireline firms respond to a reduction in sales tax rate with the elasticity coefficients calculated for each industry (cable TV: +0.0408 and wireless/wireline: +0.0332). In the pessimistic scenario, both industries respond to a reduction in sales tax rate with the elasticity coefficient calculated for the wireless and wireline industries (+0.0332). According to the optimistic scenario, the cable TV and wireless/wireline industries respond to a reduction in sales tax rate with the elasticity coefficient of the cable TV industry (+0.0408).

As indicated in section 3.1, the cable TV, wireless and wireline industries paid in 2010 a total sales tax on equipment purchasing of $1,395 million. This is based on an average sales tax on initial equipment purchase of 4.02% for the wireless and wireline industries, and 4.45% for the cable TV industry (for the 66% of the investment that could be taxable). These taxes are based on levies collected from wireless and wireline sectors in 30 states, and cable TV collections in 31 states and the District of Columbia.

Four investment cases were calculated, in which the average taxes for both sectors would be reduced to 3.00%, 2.00%, 1.00%, and completely eliminated (in all the cases we keep constant that in average the 66% of the investment purchasing is taxable). The impact on additional short-term investment was estimated based on the three alternative scenarios described above. All the results are presented in table 9.

Table 9. Short-Term (one-year) Incremental Network Investment resulting from changes in Sales Tax Rate

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

Source: TAS analysis

According to the data in table 9, if sales taxes were to be reduced to an average of 3.00% and the companies keep paying sales tax for the 66% of their spending in investment, for the cable and telecommunications industries, it would generate an additional investment of $406 million (baseline scenario). Alternatively, if sales taxes were completely eliminated in all states, total communications network investment would increase between $1,400 million (pessimistic scenario) and $1,720 million (optimistic scenario). This means that under the pessimistic scenario, the industries would invest 100% of the full benefit of the tax decrease, while, under the optimistic scenario, propelled by the incentive effect identified in the research literature reviewed in chapter 2, they would invest beyond the supply of funds benefit of tax decrease (an effect of 123% of the reduction in taxes).

The results in table 9 correspond to the initial impact of a tax reduction from changes in the sales tax rate. As shown in the econometric model of Table 5, the investment of year 2 depends on the investment of the year 1 (the "inertia" effect). The cable TV industry invests, *ceteris paribus*, 50.19% of the investment per capita of the prior year, while the telecommunications industry 43.75%. Consequently, the elimination or reduction of sales taxes produces not only a short-term (depicted in Table 9) but also a long-term effect on investment.

Long-term effects on investment have been estimated first for year 3 after a change in the sales tax rate. According to the econometric model, in year 3 communications firms invest about three times more than in the first year after the sales tax reduction is enacted (see table 10).

Table 10. Incremental Network Investment resulting from changes in Sales Tax Rate in the third year

Sales Tax Rate for Cable & Telco	Scenario 1		Scenario 2		Scenario 3	
	Total Investment Growth	Total Investment	Total Investment Growth	Total Investment	Total Investment Growth	Total Investment
3.00%	1.91%	$ 806,679,430	2.05%	$ 864,430,431	2.35%	$ 990,803,606
2.00%	3.62%	$ 1,523,980,220	3.85%	$ 1,621,559,497	4.44%	$ 1,871,827,942
1.00%	5.32%	$ 2,241,281,010	5.65%	$ 2,378,688,564	6.53%	$ 2,752,852,279
0.00%	7.02%	$ 2,958,581,801	7.44%	$ 3,135,817,630	8.62%	$ 3,633,876,615

Source: TAS analysis

The estimates for the third year after the change in sales tax rate allow projecting the total additional investment resulting from the sum of the three years (Additional Investment of Year 1+Additional Investment of Year 2 +Additional Investment of Year 3) (see table 11).

Table 11. Incremental Long-Term Network Investment resulting from changes in Sales Tax Rate (Sum of Year 1, 2 and 3)

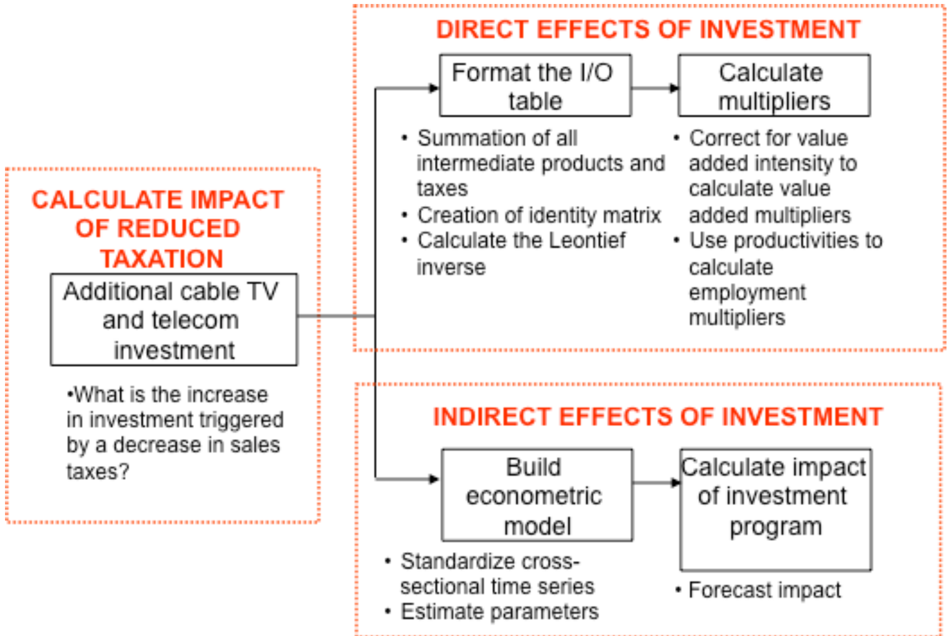
Sales Tax Rate for Cable & Wire	Scenario 1		Scenario 2		Scenario 3	
	Total Investment Growth	Total Investment	Total Investment Growth	Total Investment	Total Investment Growth	Total Investment
3.00%	4.13%	$ 1,740,403,115	4.42%	$ 1,862,208,288	5.07%	$ 2,137,649,254
2.00%	7.81%	$ 3,291,529,106	8.30%	$ 3,497,337,847	9.60%	$ 4,042,818,976
1.00%	11.49%	$ 4,842,655,097	12.18%	$ 5,132,467,406	14.12%	$ 5,947,988,697
0.00%	15.18%	$ 6,393,781,087	16.06%	$ 6,767,596,965	18.64%	$ 7,853,158,419

Source: TAS analysis

5.2. Economic impact of alternative taxation scenarios

Having calculated the impact on telecom investment of a reduction in sales taxes on initial equipment purchases, it is possible to estimate the economic effect on job creation and incremental GDP. According to the research literature, those effects can be estimated both in terms of the direct impact resulting from network deployment (e.g. construction) and in terms of the indirect positive externalities derived from additional network coverage (e.g. network spill-overs) (see figure 7).

Figure 7. Methodology for calculating the Economic Impact of Changes in Sales Taxes



Source: TAS analysis

5.2.1. Assessment of Direct Economic Effects:

The assessment of the direct impact of additional investment on telecommunications and cable TV construction was conducted by relying on Input / Output analysis, which estimates the impact of additional investment throughout the economy as a result of multipliers[9]. According to this, an elimination of sales taxes in the 30 states that currently collect on initial equipment purchasing by telecommunications and cable TV companies would generate between 30,000 and 37,000 jobs and between \$2.8 billion and \$3.4 billion in GDP (see details in table 12). This estimate is based on the impact of short-term investment impact of \$1.479 billion (see baseline scenario in table 9).

[9] See methodology in appendix A.

Table 12. Direct Economic Effect of Eliminating Sales Tax on Equipment Purchasing

			Scenario 1	Scenario 2	Scenario 3
Investment (all $ numbers in millions)			$ 1,400	$ 1,479	$ 1,720
Value added (in millions except multipliers)	Direct effect	Value-added generated in eq. mfr, construction and telecoms	$ 714	$ 754	$ 877
	Indirect effect	Value-added generated in other industrial sectors	$ 686	$ 725	$ 843
	Multiplier	(Direct + Indirect)/Direct	1.96	1.96	1.96
Employment	Direct effect	Jobs in equipment mfr, construction and telecoms	8,212	8,676	10,089
	Indirect effect	Jobs in industries supplying to telecom and construction	8,044	8,498	9,882
	Induced	Jobs generated by household spending	14,156	14,955	17,390
	Total		30,412	32,129	37,361
Total Industry Output (in millions except multipliers	Direct effect	Investment	$ 1,400	$ 1,479	$ 1,720
	Indirect effect	Additional goods generated	$ 1,408	$ 1,488	$ 1,730
	Multiplier	(Direct + Indirect)/Direct	2.01	2.01	2.01

Source: TAS analysis

Effects would, obviously, vary according to the four cases of sales tax changes defined above (from lowering the average rate to 3% to completely eliminating it). Table 13 presents the range of short-term estimates for direct network construction effects.

Table 13. Direct Short-Term Economic Effect of Changes in Sales Tax on Network Equipment Purchasing (all $ figures in billions)

Average Sales Tax	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

By relying on the sum of the incremental investment in the three years following the tax reduction (presented in table 11), the long-term impact on employment and GDP (direct and indirect effects) can be projected (see table 14).

Table 14. Direct Long-Term Economic Effect of Changes in Sales Tax on Network Equipment Purchasing (all $ figures in billions) (Total of 3 years)

Average Sales Tax	Scenario 1 (Pessimistic)			Scenario 2 (Baseline)			Scenario 3 (Optimistic)		
	Investment	Jobs (000)	Output	Investment	Jobs (000)	Output	Investment	Jobs (000)	Output
3.00%	$ 1.74	38	$ 3.48	$ 1.86	40	$ 3.72	$ 2.14	46	$ 4.28
2.00%	$ 3.29	71	$ 6.58	$ 3.50	76	$ 6.99	$ 4.04	88	$ 8.09
1.00%	$ 4.84	105	$ 9.69	$ 5.13	111	$ 10.26	$ 5.95	129	$ 11.90
0.00%	$ 6.39	139	$ 12.79	$ 6.77	147	$ 13.54	$ 7.85	171	$ 15.71

Source: TAS analysis
Note: The number of jobs is presented as year/jobs

5.2.2. Assessment of Indirect Economic Effects:

To estimate the impact of indirect effect generated through externalities, two fixed effects models that assess the impact of telecom investment on state GDP and unemployment were built:

MODEL I: Contribution of Network Investment to State GDP per capita

$$\Delta GDP\ PC_{it} = a_1 \Delta Telecom\ Investment_{it} + a_2\ \Delta Population_{it} + Fixed\ Effect_i + \varepsilon_{it}$$

MODEL II: Contribution of Network Investment to Job Creation (indirect effect)

$$\Delta Unemployment_{it} = a_1 \Delta Telecom\ Investment_{it} + a_2\ \Delta GDP\ Pc_{it} + Fixed\ Effect_i + \varepsilon_{it}$$

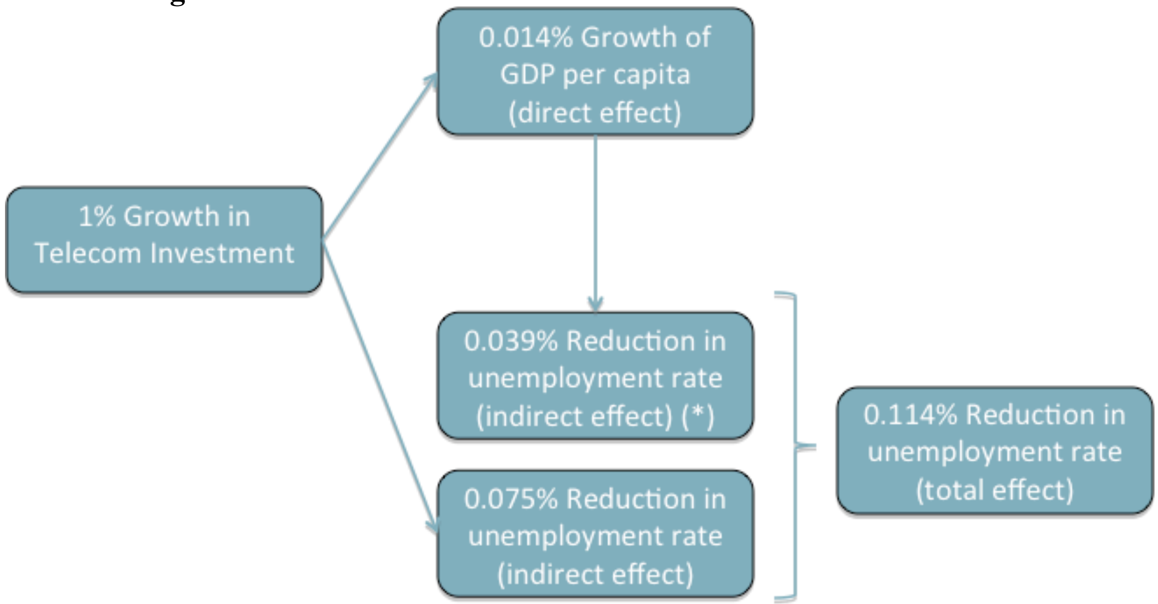
The models indicate that telecom investment contributes to the growth of state GDP and the reduction of the unemployment rate as a result of positive externalities[10]. In particular:

- 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)
- When state GDP per capita grows by 0.14% as a result of network investment, the state unemployment rate decreases by 0.039% (indirect effect)

In schematic terms, the growth in GDP will indirectly create new jobs, which need to be added to the direct employment impact, resulting in a total effect of 1.14% (see figure 8).

[10] See model results in appendix B.

Figure 8. First Order Effect of Increase in Network Investment



(*) Calculated as Growth of GDP per capita (0.14%) * Reduction in unemployment resulting from growth in GDP per capita (-2.84) = 0.390

Source: TAS analysis

It should be noted that the effects calculated through the econometric model capture both direct and indirect effects since the original data did not differentiate between either effects.

Table 15 presents the short-term direct and indirect economic impact of alternative sales tax levels according to the three scenarios described above.

Table 15. Total (Direct and Indirect) Short-Term Economic Effect of Changes in Sales Tax on Network Equipment Purchasing (all $ figures in billions)

Average Sales Tax	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

Table 16 presents the long-term direct and indirect effects over three years of an elimination of sales taxes on equipment purchasing.

Table 16. Total (Direct and Indirect) Long-Term Economic Effect of Changes in Sales Tax on Network Equipment Purchasing (all $ figures in billions) (Total of 3 years)

Average Sales Tax	Scenario 1 (Pessimistic)			Scenario 2 (Baseline)			Scenario 3 (Optimistic)		
	Investment	Jobs (000)	Output	Investment	Jobs (000)	Output	Investment	Jobs (000)	Output
3.00%	$ 1.74	63	$ 8.52	$ 1.86	67	$ 9.12	$ 2.14	77	$ 10.46
2.00%	$ 3.29	118	$ 16.11	$ 3.50	126	$ 17.12	$ 4.04	145	$ 19.79
1.00%	$ 4.84	174	$ 23.70	$ 5.13	184	$ 25.12	$ 5.95	214	$ 29.11
0.00%	$ 6.39	230	$ 31.30	$ 6.77	243	$ 33.13	$ 7.85	282	$ 38.44

Source: TAS analysis

Additionally, the increase in network investment results in a growth of broadband penetration, particularly in low broadband penetrated states. According to the model that estimates the impact of telecom investment growth on broadband penetration growth, if communications network investment increases by 1%, broadband penetration would increase by 0.07% a year later. In particular, for states with low broadband penetration, if network investment increases by 1%, broadband penetration increases by 0.135% one year later[11].

[11] Telecom investment does not appear to have a noticeable effect on broadband penetration in highly penetrated states, potentially due to saturation and substitution effects. In other words, when broadband is massively adopted, increased investment would gravitate towards improving quality of service, such as deployment of DOCSIS 3.0 in the case of cable or fiber optics in the case of telecommunications operators. See model in Appendix C.

CASE STUDIES

- **CALIFORNIA**
- **GEORGIA**
- **MARYLAND**
- **ILLINOIS**
- **OKLAHOMA**
- **TEXAS**
- **WASHINGTON**

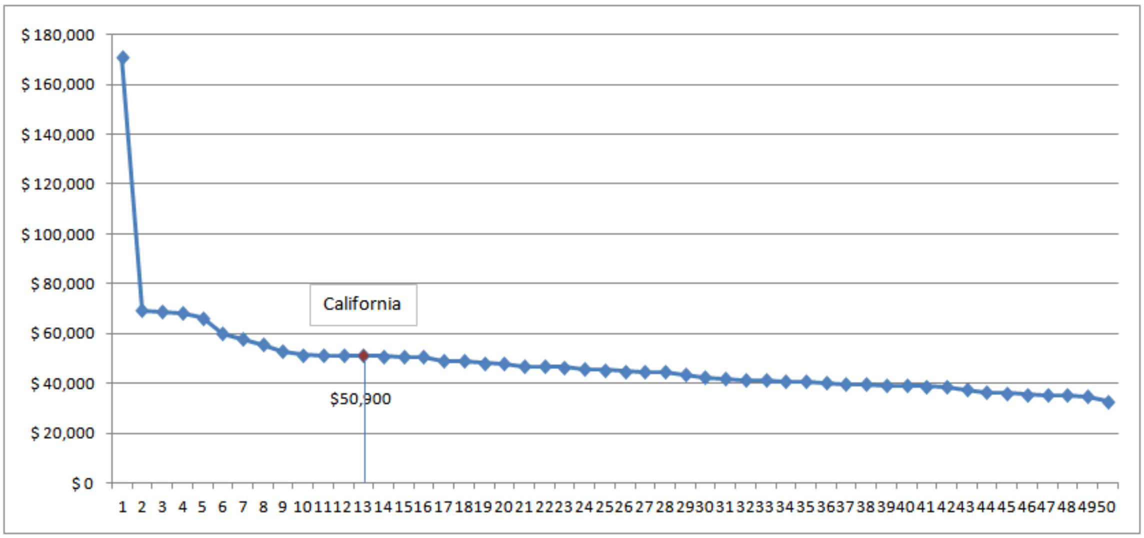
6. THE ECONOMIC CONTRIBUTION OF COMMUNICATIONS NETWORK INVESTMENT IN CALIFORNIA

Having proven that a reduction of sales taxes on initial communications network equipment purchases has a substantial economic impact on a national scale, it is pertinent now to address what that impact would be in the State of California.

6.1. The California economy:

California ranks 13th in the United States in terms of GDP per capita (see figure 9).

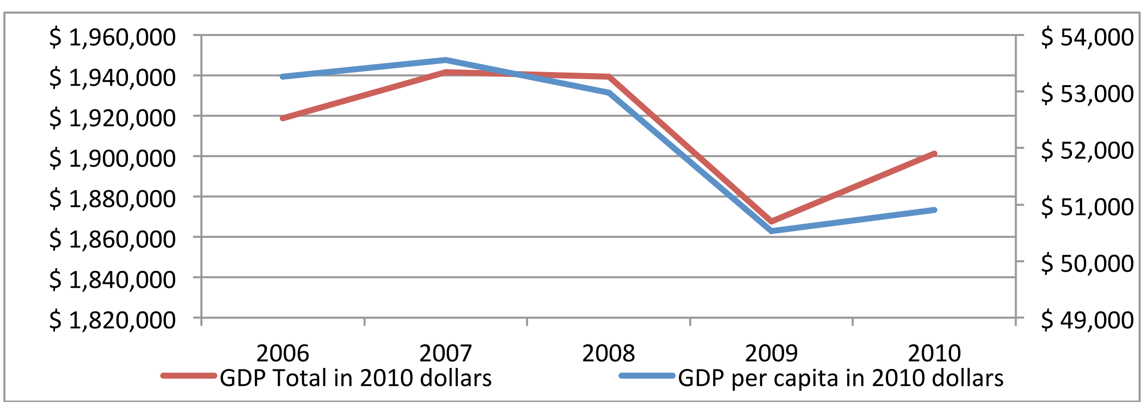
Figure 9. United States: States Ranking by GDP per Capita (2010)



Source: US Census Bureau; TAS analysis

Between 2006 and 2010 the California GDP per capita dropped by 4.44%, while the total GDP also dropped but by only 0.91% (the difference is explained by an increase in total population).

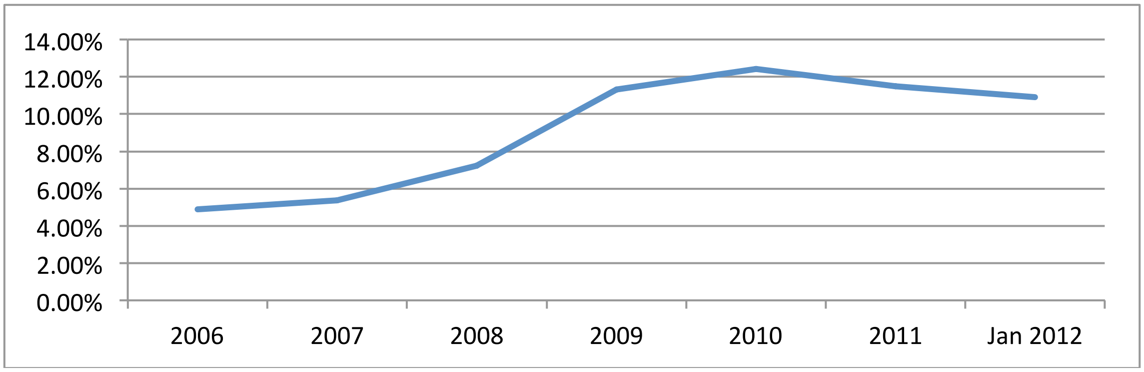
Figure 10. California GDP (2006-2010)



Note: GDP Total in Thousands of 2010 dollars
Source: US Census Bureau; TAS analysis

In January 2012, California's unemployment rate was 10.90%, which implies that 2,019,516 individuals of a total labor force of 18,462,256 were unemployed. The unemployment rate increased through 2010, but has slightly declined since then (figure 11):

Figure 11. California Unemployment Rate (2006-2012)



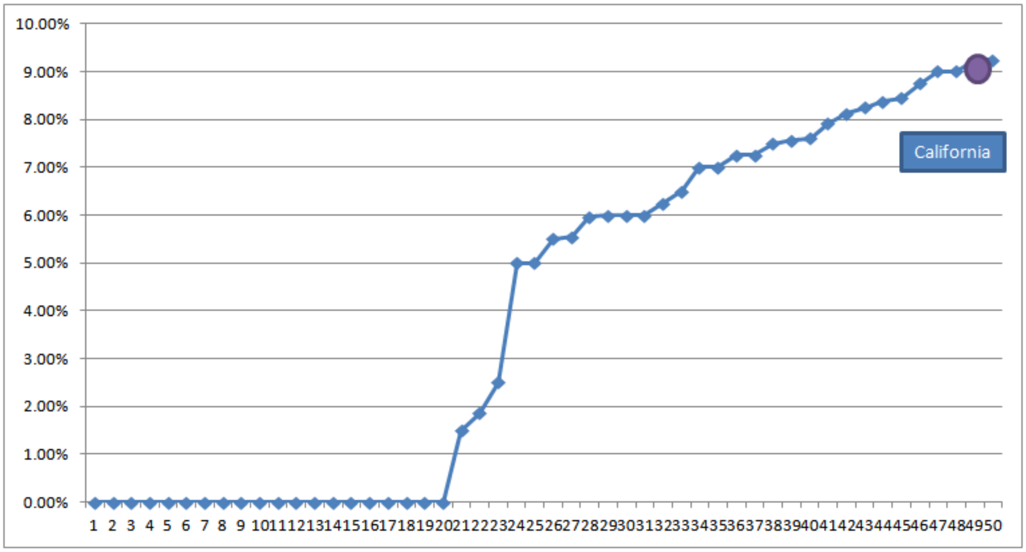
Source: US Census Bureau; TAS analysis

In this context, it is critical to consider public policies that might induce both economic growth and job creation.

6.2. Current taxation regime on initial equipment purchasing by telecommunications and cable TV operators in California:

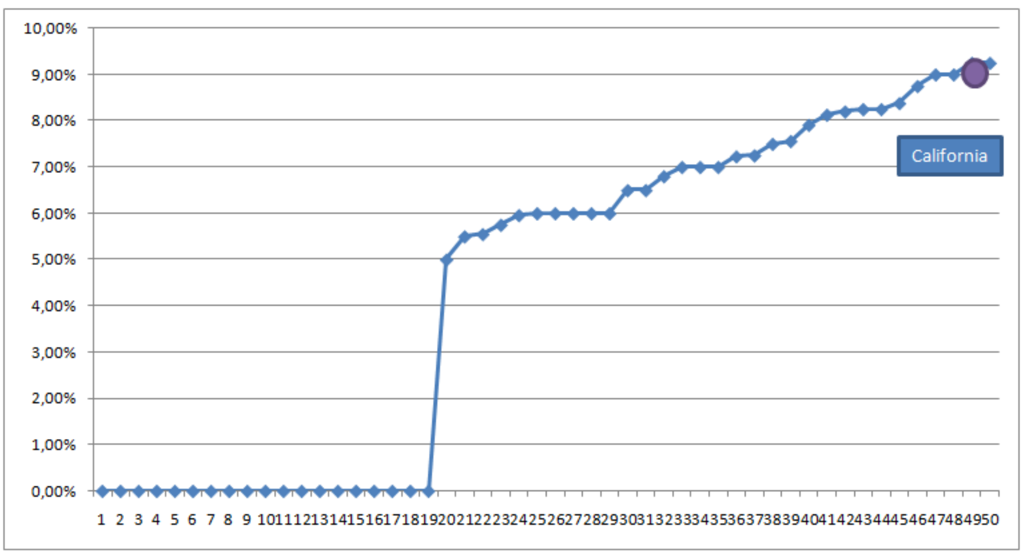
California is one of 30 states that apply a sales tax to telecommunications network equipment and one of 31 states (plus the District of Columbia) that apply the sales tax on cable network investments. Both cable TV operators and telecommunications companies paid a sales tax rate of 9.25% (weighted average combined state-local rate for the state) in 2010. This implies that California has the 2nd highest tax rate for communications investment affecting both the telecommunications and cable industries (see figures 12 and 13).

Figure 12. Ranking of Sales Tax Rate on Investment in Wireless & Wireline 2010



Source: Broadband Tax Institute; TAS analysis

Figure 13. Ranking of Sales Tax Rate on Investment in Cable 2010

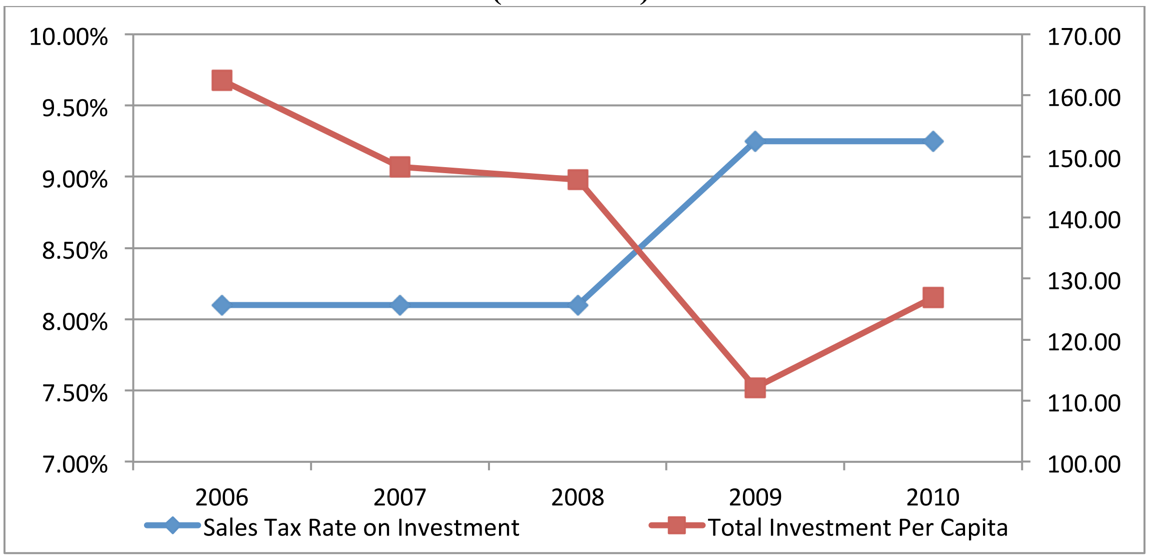


Source: Broadband Tax Institute; TAS analysis

The evolution of the sales tax rate on equipment investment and telecommunications and cable TV investment per capita in California indicates that both variables are inversely correlated[12] (see figure 14).

[12] The correlation coefficient is -0.91

Figure 14. California: Sales Tax Rate and Communications Investment Per Capita (2006-2010)



Source: Broadband Tax Institute Data; TAS analysis

From 2008 to 2009, California increased its weighted state-local taxes from 8.10% to 9.25%. Simultaneously, the total telecommunications and cable TV investment per capita consistently declined, from $162.47 in 2008 to $112.15 in 2009. Since 2009 the sales tax rate level stopped increasing, which coupled with an improvement of the U.S. economy, resulted in an increase in the communications investment per capita from $112.15 in 2009 to $126.85 in 2010 (growth a 13.11%). In light of the inverse correlation between communications equipment sales taxes and investment (as well as the economic impact of telecommunications), it is relevant to consider what the impact would be if the sales tax on communications equipment were to be eliminated in the state.

6.3. Economic impact of taxation of communications network equipment taxation in California

By relying on the econometric models presented in section 3.2, the short run and the long run impact of an elimination of the sales tax rate in California was estimated[13]. Assuming that in year 1 the sales tax rate is eliminated, cable TV investment per capita would increase by $ 2.85 (equivalent to 10.76% over the current level of $26.53). In the case of wireline and wireless, the increase in investment would amount to $7.89 per capita (7.86% more than the current level of $100.32). In total, the increase in investment in year 1 would amount to $401 million (or an 8.47% increase of an investment base of $4,738 million).

[13] To be conservative in the estimations, it was assumed that there is no exogenous growth in the GDP per Capita, in the Population or in the Human Capital, all variables in the econometric models. If such an exogneous growth would take place, the expected results of a reduction in sales taxes would be higher than predicted.

Furthermore, investment in year 2 would be, to a large degree, dependent on the level in year 1. For example, according to our models, 50.19% of cable TV investment in year 2 is dependent on the investment in year 1, while in the case of the wireless and wireline industries, the value is 43.75% As a result, the effect of an elimination of sales taxes produces not only a short-term but also a long-term effect on investment levels (see table 17).

Table 17. Estimations of the Growth in Investment as consequence of an elimination of the sales Tax Rate in California

	Year 1	Year 2	Year 3	Total
Investment Growth	$ 401,242,339	$ 583,649,684	$ 849,305,194	$ 1,834,197,217
Savings from Sales Tax Elimination	$ 308,031,596	$ 308,031,596	$ 308,031,596	$ 924,094,789
Share of Savings Reinvested	130.26%	189.48%	275.72%	198.49%

Source: TAS analysis

The projections of table 17 indicate that, as a result of an elimination of the sales tax on initially purchased equipment, in year 1 the cable TV, wireless and wireline operators reinvest 130% of what they would have paid as sales tax, and over the long run they would have the incentive to invest more than what they would have saved. In three years investment levels would represent 198% of saved taxes. This is validated by the case of North Dakota reviewed in section 3.3.

In turn, this additional investment would generate an impact on the economy of the state. By relying on the coefficients of the econometric models of section 3.2, the following estimates of socio-economic impact were calculated (see table 18).

Table 18. Estimation of Direct and Indirect Socio-Economic impact of eliminating sales tax on communications equipment purchases in California

Economic Indicators	Current Level	Short Run	Long Run
GDP Per Capita	$ 50,900	$ 50,960	$ 51,173
GDP Per Capita Growth	0.00%	0.12%	0.54%
Incremental GDP	$ 0	$ 2,226,855,438	$ 10,179,613,786
Unemployment Rate	10.90%	10.79%	10.55%
Jobs created	0	19,446	65,147
Broadband Connections	21,498,000	21,624,732	22,077,331
Broadband Penetration	57.56%	57.90%	59.11%

Source: TAS analysis

The economic analysis based on the models specified shows that eliminating the sales and use tax on communications infrastructure would over three years:

- Generate over $10,150 million in new economic activity in California[14];
- Create 65,000 new private sector jobs paying 2,770,000,000 annually in wages[15];
- Generate a conservative estimate of $206 million in new state and local taxes.

The studies reviewed in chapter 4 have shown that the productivity benefits associated with investments in communications networks are broadly distributed across the many businesses, governments, and non-profits that use information technology and communication services. Therefore, capital investments made by communications companies improve infrastructure that benefits the entire state of California, not just the companies making the investments. The $10,150 million in new economic activity that would result from the elimination of sales taxes on communications network investments would benefit sectors as diverse as wholesale trade, accounting, finance, building trades, and hospitals.

An exemption in sales taxes for communications equipment in California would create 65,000 new private sector jobs paying over $2,770 million annually in wages. The jobs impact would be widespread as new jobs are created not only in the installation of new equipment but also in the many business sectors that rely on communications networks to develop new, more efficient and profitable ways to do business. The new economic activity will generate substantial offsetting revenues for state and local governments as new employment and economic activity generates income, sales, property, and other tax revenue for governments.

More rapid investment in communications networks will have immediate and direct benefits for consumers as well. New investment will benefit consumers by providing better and faster communications networks. New investments will also accelerate competition between wireless, wireline, and cable providers of high-speed communications services. This competition directly benefits consumers through better services and lower prices.

7. THE ECONOMIC CONTRIBUTION OF COMMUNICATIONS NETWORK INVESTMENT IN GEORGIA

The economic gains of reducing the sales tax on initial communications equipment purchases are not only realized in California. The state of Georgia would also be able to improve its current economic situation if it were to reduce, or outright exempt communications equipment from the 7.50% tax.

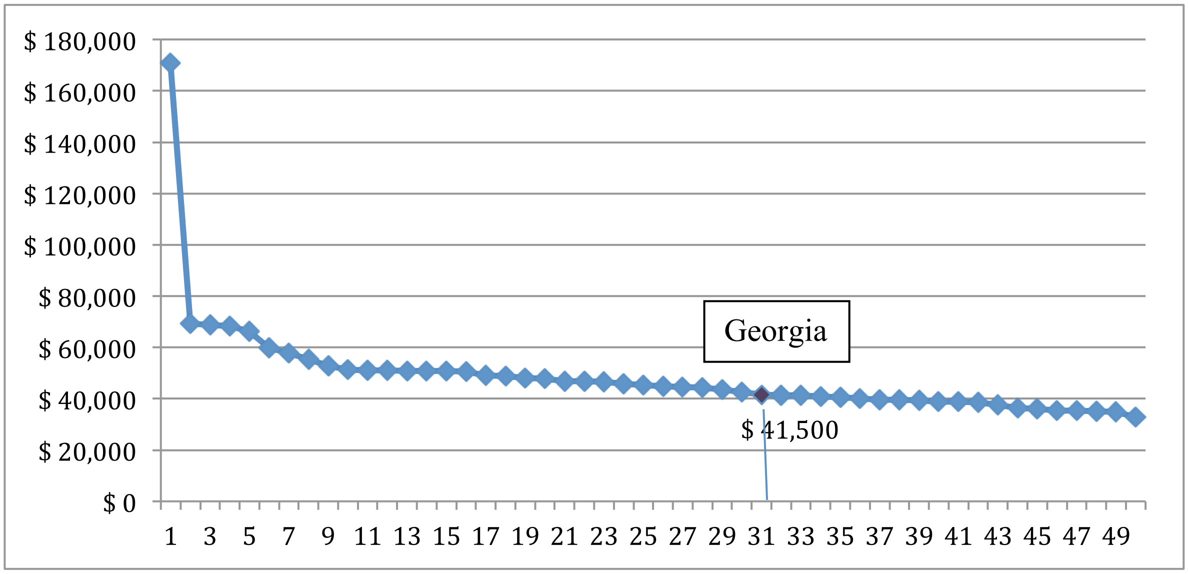
7.1. The situation of the Georgia economy:

The state of Georgia ranks 31th in the United States in terms of GDP per capita (see figure 15).

[14] This estimate is calculated by multiplying the incremental GDP Per Capita of $273 by California´s population of 37,349,363.

[15] The Bureau of Labor Statistics indicates that the Mean Annual Wage in California is $42,578

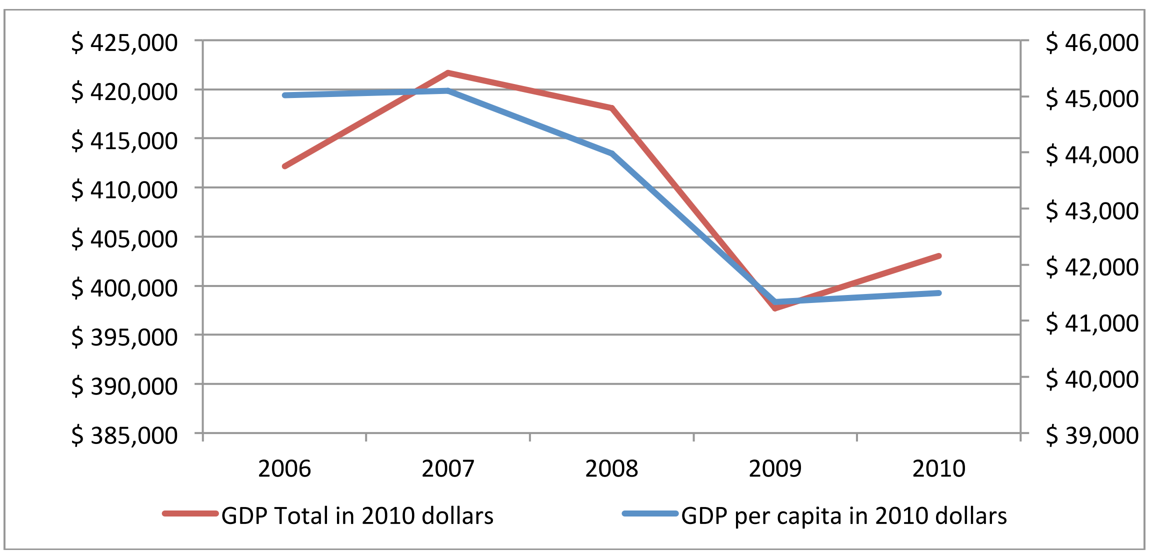
Figure 15. United States: States Ranking by GDP per Capita (2010)



Source: US Census Bureau; TAS analysis

Between 2006 and 2009 Georgia GDP per capita dropped by 10%, while total GDP grew by 1% (the difference is explained by an increase in total population).

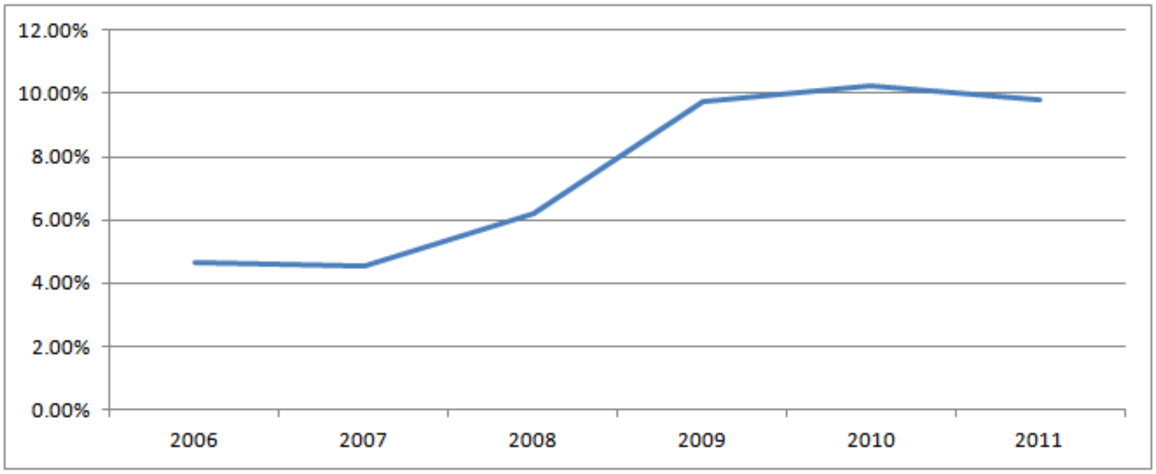
Figure 16. Georgia GDP (2006-2010)



Source: US Census Bureau; TAS analysis

In 2011, Georgia's unemployment rate was 9.80%, which implies that approximately 457,000 individuals of a total labor force of 4,663,000 are currently unemployed. Unemployment rate has increased between 2007 and 2010 and declined slightly in 2011 (Figure 17):

Figure 17. Georgia Unemployment Rate (2006-2011)



Source: US Census Bureau; TAS analysis

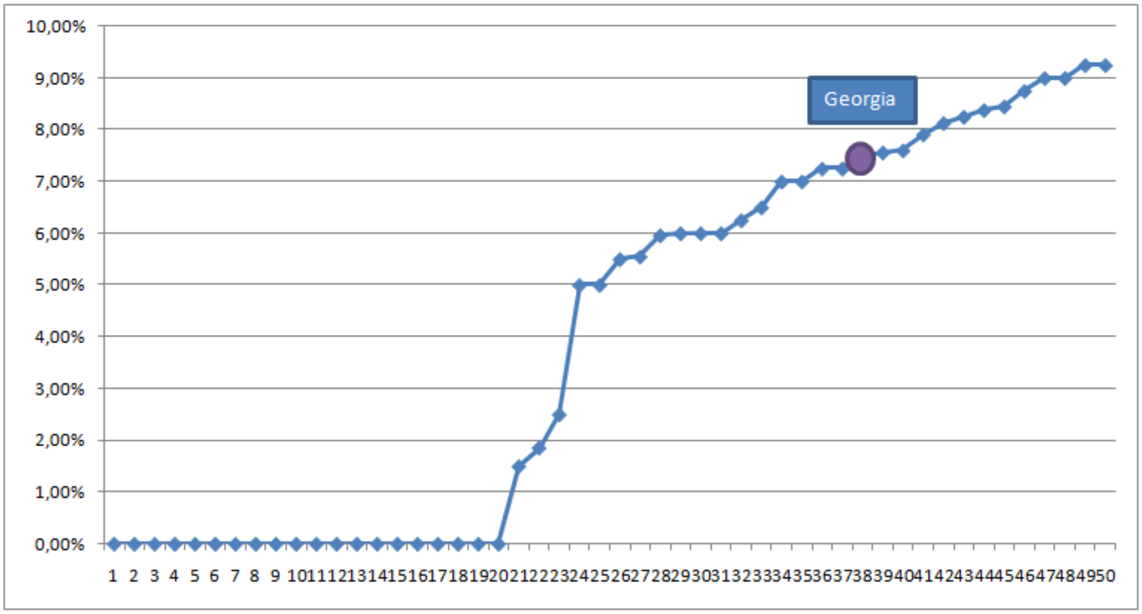
In this context, it is critical to consider public policies that might induce both economic growth and job creation to counter the current trends.

7.2. Current taxation regime on initial equipment purchasing by telecommunications and cable TV operators in Georgia:

Georgia is one of 30 states that apply a sales tax to telecommunications network equipment and one of 31 states (plus the District of Columbia) that apply the sales tax on cable network investments. The state imposes a sales and use tax of 4%, with additional rates between 1% and 4% imposed locally. The overwhelming majority of counties impose a rate of 3%, while a handful of counties impose local option rates of either 1% or 2%. The rate in the city of Atlanta is 8%, which includes the 4% state tax, the 1% city tax, and the 3% county tax. The weighted average combined state-local rate for the state is 7.50%.

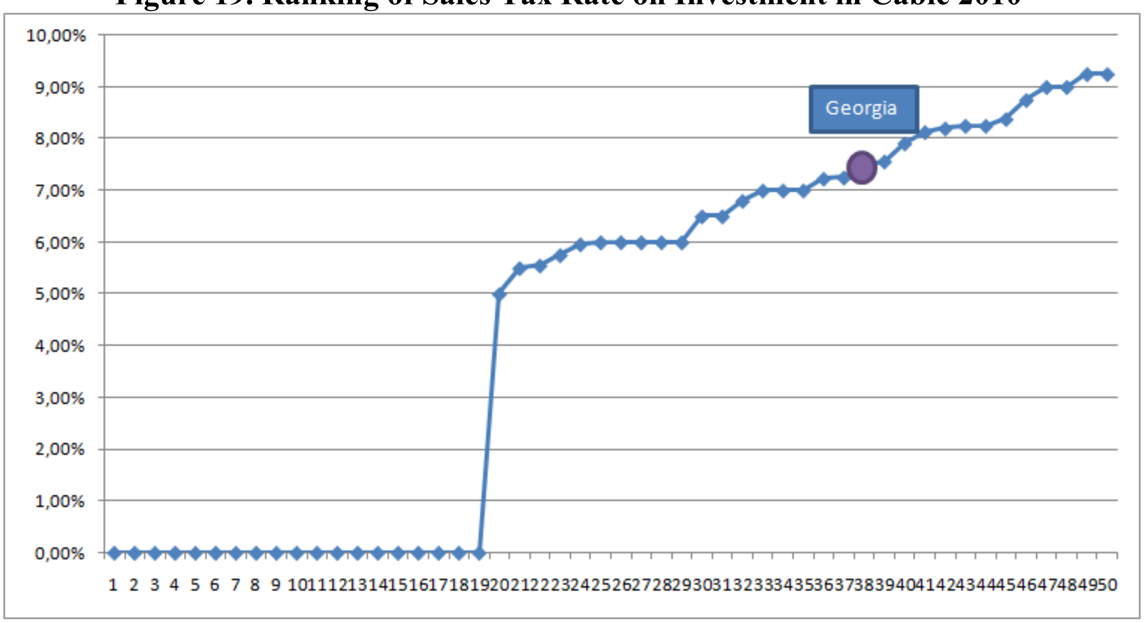
This implies that Georgia has the 13th highest tax rate for wireless and wireline telecommunications of the country and also the 13th highest for cable investment (see figures 18 and 19).

Figure 18. Ranking of Sales Tax Rate on Investment in Wireless & Wireline 2010



Source: Broadband Tax Institute; TAS analysis

Figure 19. Ranking of Sales Tax Rate on Investment in Cable 2010

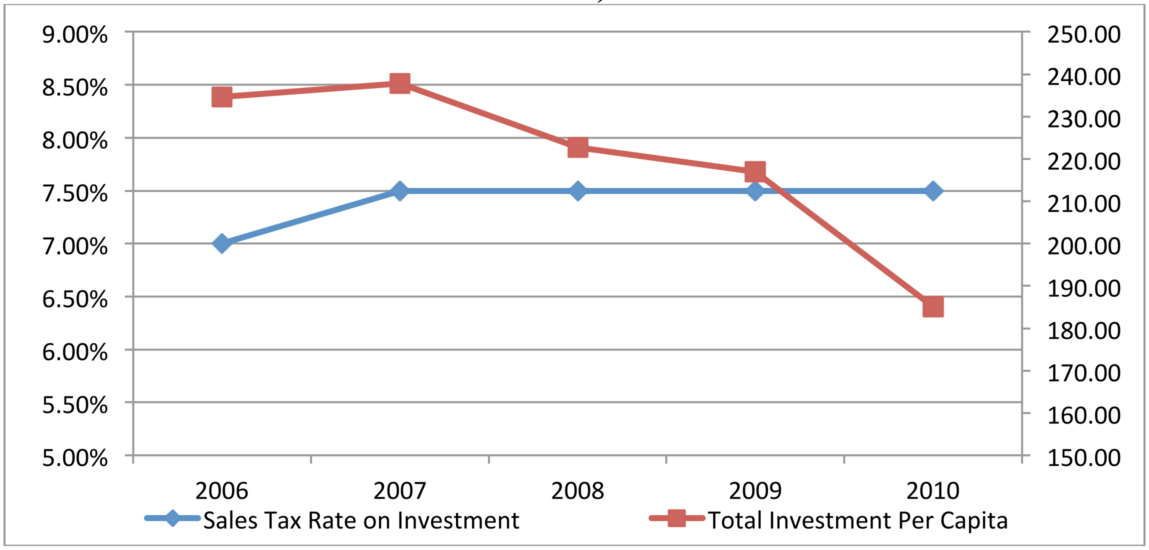


Source: Broadband Tax Institute; TAS analysis

The evolution of sales tax rate on equipment investment and telecommunications and cable TV investment per capita indicates that both variables are inversely correlated[16] (see figure 20).

[16] The correlation coefficient is -0.41

Figure 20. Georgia: Evolution of Sales Tax Rate and Investment Per Capita (2006-2010)



Source: Broadband Tax Institute Data; TAS analysis

From 2006 to 2007, Georgia increased its weighted state-local taxes from 7.00% to 7.50%. The incentives of the companies to invest were reduced and the total telecommunications and cable TV investment per capita has been consistently declining between 2006 and 2010, from $234.63 to $185.11. The declining tendency in investment appears to be accelerating, due to inertia effect in capital planning: an increase in sales taxes in year 1 triggers a corresponding decline in investment in that year and drives an additional decrease in year 2. However, in year 2, another increase in sales taxes accentuates the negative impact on investment because it influences the portion of the investment that is decided on annual basis.

7.3. Economic impact of communications network equipment taxation in Georgia

The Georgia legislature is currently considering a tax reform proposal that includes a provision to exempt communications network equipment purchases from state and local sales taxes (now the companies' are paying sales taxes for an average of 66% of their investment spending). By relying on the econometric models presented in section 3.2, the short run and the long run impact of an elimination of the sales tax rate in Georgia was estimated[17].

Assuming that in year 1 the sales tax rate is eliminated, cable TV investment per capita would increase by $ 2.31 (equivalent to 7.91% over the current level of $29.26). In the case of wireline and wireless, the increase in investment would amount to $6.40 per capita (4.10% more than the current level of $155.85). In total, the increase in

[17] To be conservative in the estimations, it was assumed that there is no exogenous growth in the GDP per capita, in the Population or in the Human Capital, all variables of the econometric models. If such an exogneous growth would take place, the expected results of a reduction in sales taxes would be higher than predicted.

investment in year 1 would amount to $84.6 million (or a 4.71% increase of a base of $1,798 million).

Furthermore, the investment in year 2 would be, to a large degree, dependent on the level in year 1. For example, according to our models, 50.19% of cable TV investment in year 2 is dependent on the investment in year 1, while in the case of the wireless and wireline industries, the value is 43.75% As a result, the effect of an elimination of sales taxes produces not only a short-term but also a long-term effect on investment levels (see table 19).

Table 19. Estimations of the Growth in Investment as consequence of an elimination of the Sales Tax on Network Investment

	Year 1	Year 2	Year 3	Total
Investment Growth	$ 84,601,489	$ 123,061,869	$ 179,075,030	$ 386,738,389
Savings from Sales Tax Elimination	$ 93,628,604	$ 93,628,604	$ 93,628,604	$ 280,885,812
Share of Savings Reinvested	90.36%	131.44%	191.26%	137.69%

Source: TAS analysis

The projections of table 19 indicate that, as a result of an elimination of the sales tax on initially purchased equipment, in year 1 the cable TV, wireless and wireline operators reinvest 90% of what they would have paid as sales tax, and over the long run they would have the incentive to invest more than what they would have saved. In a period of three years investment would represent 138% of saved taxes. This is validated by the case of North Dakota reviewed in section 3.3.

In turn, this additional investment would generate an impact on the economy of the state. By relying on the coefficients of the econometric models of section 3.2, the following estimates of socio-economic impact were calculated (see table 20).

Table 20. Estimation of Direct and Indirect Socio-Economic impact of eliminating sales tax on Communications Network Equipment Purchases in Georgia

Economic Indicators	Current Level	Short Run	Long Run
GDP Per Capita	$ 41,500	$ 41,527	$ 41,623
GDP Per Capita Growth	0.00%	0.07%	0.30%
Incremental GDP	$ 0	$ 262,333,011	$ 1,199,201,659
Unemployment Rate	9.80%	9.75%	9.62%
Jobs Created	0	2,453	8,219
Broadband Connections	5,250,000	5,267,196	5,328,608
Broadband Penetration	54.05%	54.23%	54.86%

Source: TAS analysis

It should be noted, that the incremental GDP should be added to the overall trend in the economy: if the economy grows, this incremental effect should be added to the natural growth; conversely, if the economy contracts, the incremental impact of table 20 would offset the decline.

The economic analysis based on the models specified shows that eliminating the sales and use tax on communications infrastructure would over three years:

- Generate over $1,199 million in new economic activity in Georgia[18];
- Create 8,200 new private sector jobs paying 286,000,000 annually in wages[19];
- Generate a conservative estimate of $19 million in new state and local taxes.

Recent studies have shown that the productivity benefits associated with investments in communications networks are broadly distributed across the many businesses, governments, and non-profits that use information technology and communication services. Capital investments made by communications companies improve infrastructure that benefits the entire state of Georgia, not just the companies making the investments. The $1,199 million in new economic activity that would result from the elimination of sales taxes on communications network investments would benefit sectors as diverse as wholesale trade, accounting, finance, building trades, and hospitals.

This proposal would create 8,200 new private sector jobs paying over $286 million annually in wages. The jobs impact would be widespread as new jobs are created not only in the installation of new equipment but also in the many business sectors that rely on communications networks to develop new, more efficient and profitable ways to do business (e.g. wholesale trade, health care, etc.).

The new economic activity will generate substantial offsetting revenues for state and local governments as new employment and economic activity generates income, sales, property, and other tax revenue for governments.

More rapid investment in communications networks will have immediate and direct benefits for consumers as well. New investment will benefit consumers by providing better and faster communications networks. New investments will also accelerate competition between wireless, wireline, and cable providers of high-speed communications services. This competition directly benefits consumers through better services and lower prices.

8. THE ECONOMIC CONTRIBUTION OF COMMUNICATIONS NETWORK INVESTMENT IN MARYLAND

After explaining the economic benefits that California and Georgia would achieve by eliminating the sales tax rate on communications equipment, the impact of a similar scenario was calculated for the State of Maryland.

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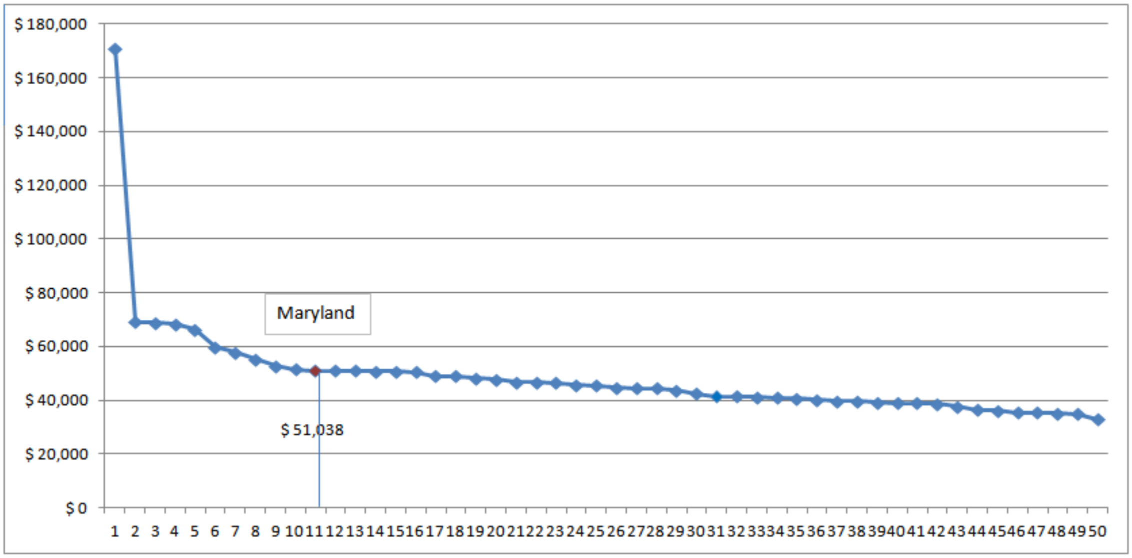
[18] This estimate is calculated by multiplying the additional GDP Per Capita of $123 by Georgia's population of 9,712,587.

[19] The Bureau of Labor Statistics indicates that the Mean Annual Wage in Georgia is of $34,800

8.1. The situation of the Maryland economy:

The state of Maryland ranks 11th in the United States in terms of GDP per capita (see figure 21).

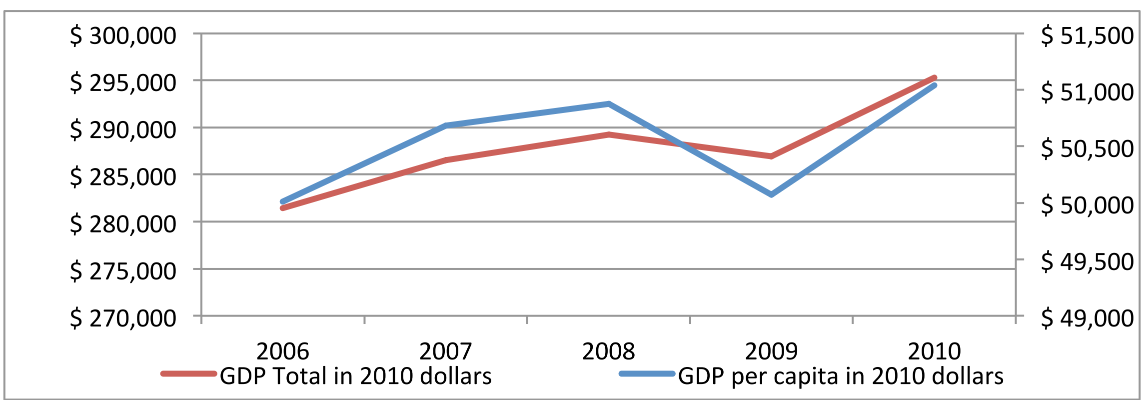
Figure 21. United States: States Ranking by GDP per Capita (2010)



Source: US Census Bureau; TAS analysis

Between 2006 and 2010 the Maryland GDP per capita grew by 2.06%, while the total GDP also increased, albeit by 4.93% (the difference is explained by an increase in total population).

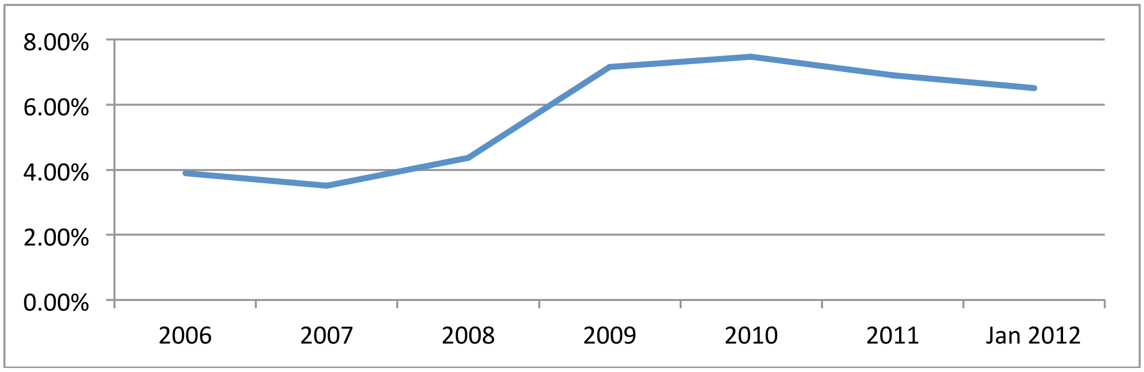
Figure 22. Maryland GDP (2006-2010)



Note: GDP Total in Thousands of 2010 dollars
Source: US Census Bureau; TAS analysis

In January 2012, Maryland´s unemployment rate was 6.50%, which implies that 200,228 individuals of a total labor force of 3,079,224 are currently unemployed. Unemployment rate increased between 2006 and 2010 and has slightly declined since, as follows (Figure 23):

Figure 23. Maryland Unemployment Rate (2006-2012)



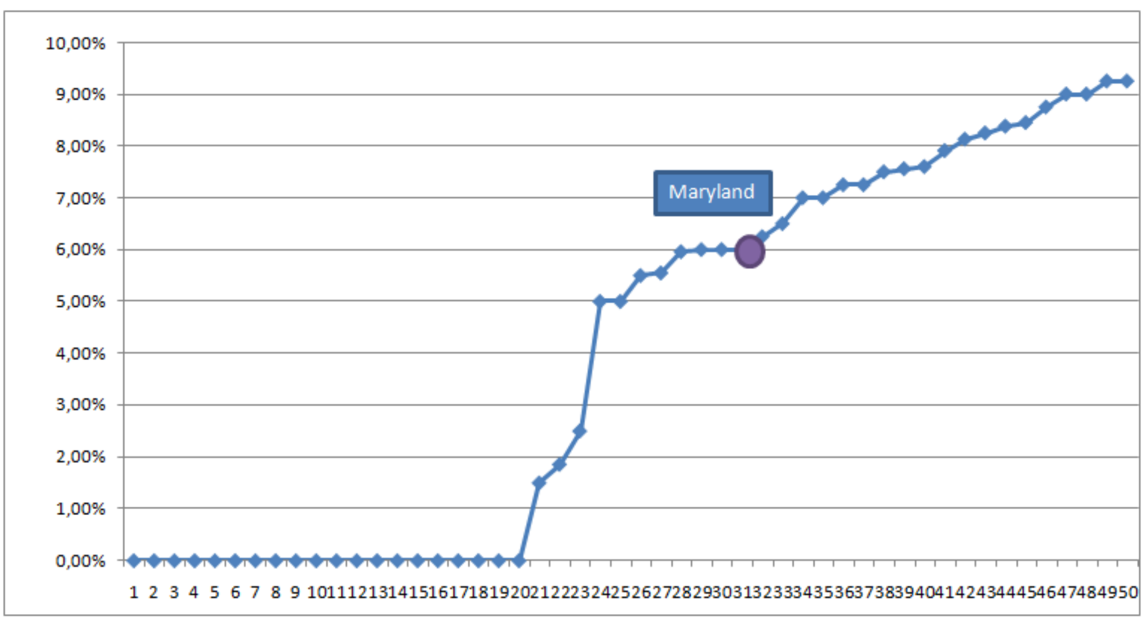
Source: US Census Bureau; TAS analysis

In this context, it is critical to consider public policies that might induce both economic growth and job creation to counter the current trends.

8.2. Current taxation regime on initial equipment purchasing by telecommunications and cable TV operators in Maryland:

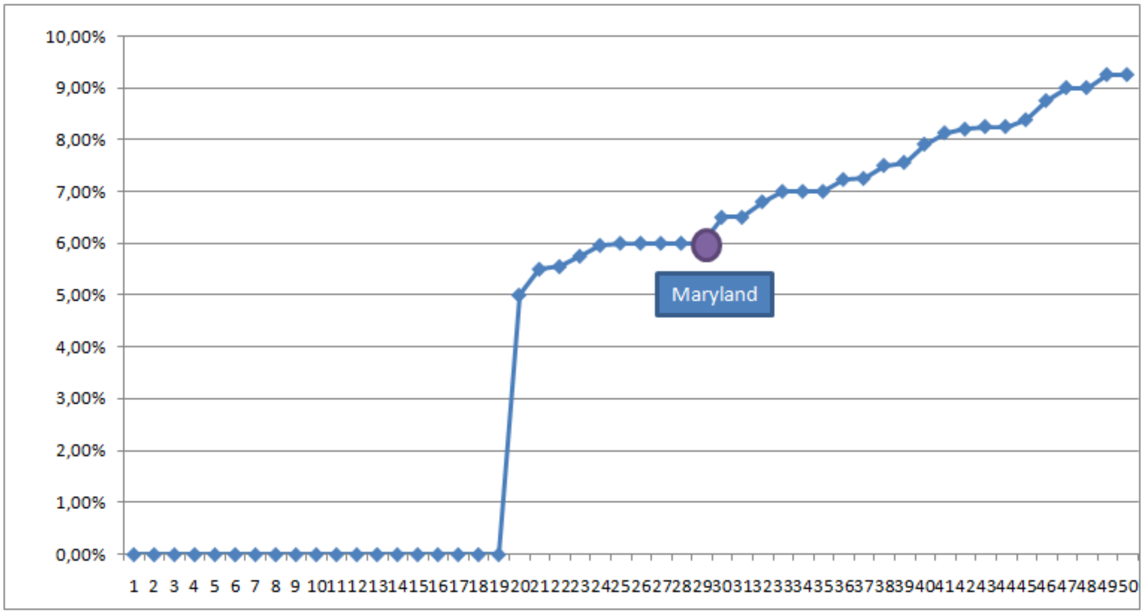
Maryland is one of 30 states that apply a sales tax to telecommunications network equipment and one of 31 states (plus the District of Columbia) that apply the sales tax on cable network investments. In 2010 communications equipment investment was taxed at 6.00% (weighted average combined state-local rate for the state) in 2010. This implies that Maryland has the 20th highest tax rate for wireless and wireline telecommunications of the country and the 24th highest for cable investment (see figures 24 and 25).

Figure 24. Ranking of Sales Tax Rate on Investment in Wireless & Wireline 2010



Source: Broadband Tax Institute; TAS analysis

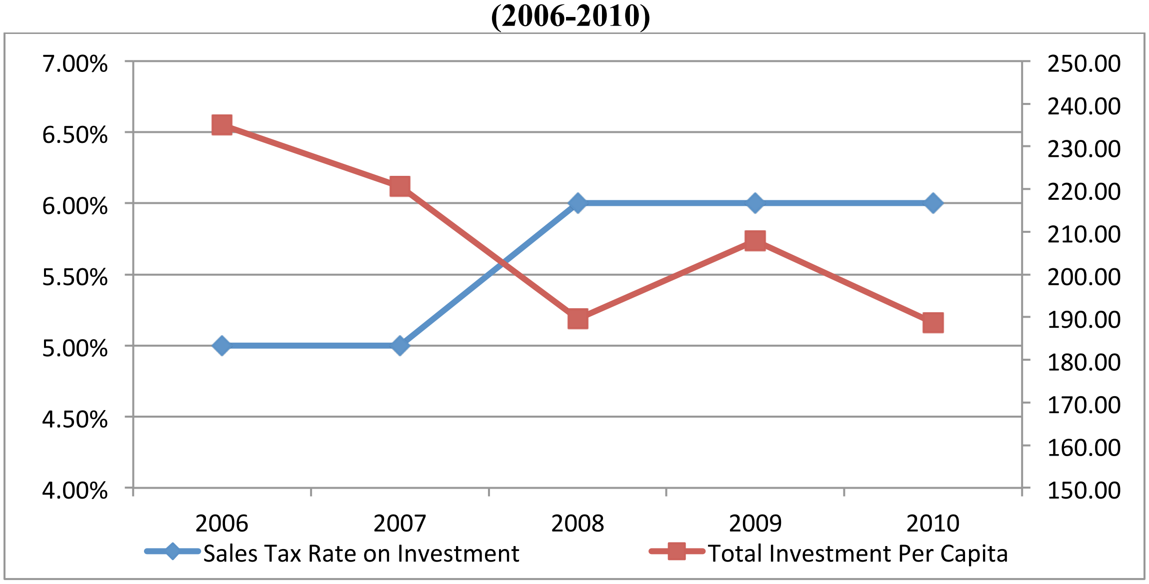
Figure 25. Ranking of Sales Tax Rate on Investment in Cable 2010



Source: Broadband Tax Institute; TAS analysis

The evolution of sales tax rate on equipment investment and telecommunications and cable TV investment per capita indicates that both variables are inversely correlated[20] (see figure 26).

Figure 26. Maryland: Evolution of Sales Tax Rate and Investment Per Capita (2006-2010)



Source: Broadband Tax Institute Data; TAS analysis

[20] The correlation coefficient is -0.89

Maryland increased its state-local taxes from 5.00% to 6.00% in 2008, and has held it at this level since. That decision resulted in a decrease of the total telecommunications and cable investment per capita from $235.05 in 2006 to $188.73 in 2010 (20% less investment per capita). The declining trend in investment begun in 2007. In 2009, investment rebounded for one year and declined afterwards.

8.3. Economic impact of communications network equipment taxation in Maryland

By relying on the econometric models presented in section 3.2, the short run and the long run impact of an elimination of the sales tax rate in Maryland was estimated[21]. Assuming that in year 1 the sales tax rate is eliminated, cable TV investment per capita would increase by $ 1.85 (equivalent to 5.77% over the current level of $32.10). In the case of wireline and wireless, the increase in investment would amount to $5.12 per capita (3.27% more than the current level of $156.63). In total, the increase in investment in year 1 would amount to $40 million (or a 3.69% increase of a base of $1,092 million).

However, investment in year 2 would be, to a large degree, dependent on the level in year 1. For example, according to our models, 50.19% of cable TV investment in year 2 is dependent on the investment in year 1, while in the case of the wireless and wireline industries, the value is 43.75% As a result, the effect of an elimination of sales taxes produces not only a short-term but also a long-term effect on investment levels (see table 21).

Table 21. Estimations of the Growth in Investment as consequence of an elimination of the sales Tax Rate in Maryland

	Year 1	Year 2	Year 3	Total
Investment Growth	$ 40,319,037	$ 58,648,330	$ 85,342,857	$ 184,310,224
Savings from Sales Tax Elimination	$ 45,025,802	$ 45,025,802	$ 45,025,802	$ 135,077,406
Share of Savings Reinvested	89.55%	130.25%	189.54%	136.45%

Source: TAS analysis

The projections of table 21 indicate that, as a result of an elimination of the sales tax on initially purchased equipment, in year 1 the cable TV, wireless and wireline operators would reinvest 90% of what they would have paid as sales tax, and over the long run they would have the incentive to invest more than what they would have saved. In a period of three years investment would represent 137% of saved taxes. This is validated by the case of North Dakota reviewed in section 3.3.

[21] To be conservative in the estimations, it was assumed that there is no exogenous growth in the GDP per Capita, in the Population or in the Human Capital, all variables in the econometric models. If such an exogneous growth would take place, the expected results of a reduction in sales taxes would be higher than predicted.

In turn, this additional investment would generate an impact on the economy of the state. By relying on the coefficients of the econometric models of section 3.2, the following estimates of socio-economic impact were calculated (see table 22).

Table 22. Estimation of Direct and Indirect Socio-Economic impact of eliminating sales tax on telecommunications equipment purchase in Maryland

Economic Indicators	Current Level	Short Run	Long Run
GDP Per Capita	$ 51,038	$ 51,064	$ 51,157
GDP Per Capita Growth	0.00%	0.05%	0.23%
Incremental GDP	$ 0	$ 150,805,848	$ 689,378,063
Unemployment Rate	6.50%	6.47%	6.41%
Jobs created	0	843	2,825
Broadband Connections	3,461,000	3,469,895	3,501,662
Broadband Penetration	59.82%	59.97%	60.52%

Source: TAS analysis

The economic analysis based on the models specified shows that eliminating the sales and use tax on communications infrastructure would over three years:

- Generate over $689 million in new economic activity in Maryland[22];
- Create 2,800 new private sector jobs paying 138,000,000 annually in wages[23];
- Generate $9 million in new state and local taxes.

Recent studies have shown that the productivity benefits associated with investments in communications networks are broadly distributed across the many businesses, governments, and non-profits that use information technology and communication services. Capital investments made by communications companies improve infrastructure that benefits the entire state of Maryland, not just the companies making the investments. The $689 million in new economic activity that would result from the elimination of sales taxes on communications network investments would benefit sectors as diverse as wholesale trade, accounting, finance, construction, and health care.

This proposal would create 2,800 new private sector jobs paying over $138 million annually in wages. The jobs impact would be widespread as new jobs are created not only in the installation of new equipment but also in the many business sectors that rely on communications networks to develop new, more efficient and profitable ways to do business. The new economic activity will generate substantial offsetting revenues for state and local governments as new employment and economic activity generates income, sales, property, and other tax revenue for governments.

[22] This estimate is calculated by multiplying the additional GDP Per Capita of $119 by Maryland´s population of 5,785,982.

[23] The Bureau of Labor Statistics indicates that the Mean Annual Wage in Maryland is $49,070

More rapid investment in communications networks will have immediate and direct benefits for consumers as well. New investment will benefit consumers by providing better and faster communications networks. New investments will also accelerate competition between wireless, wireline, and cable providers of high-speed communications services. This competition directly benefits consumers through better services and lower prices.

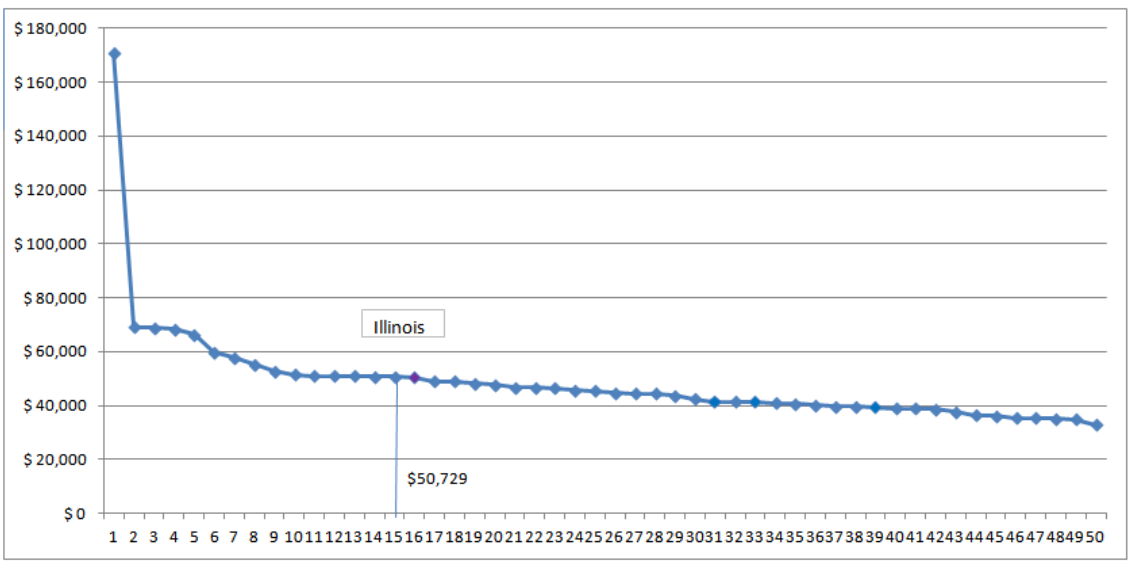
9. THE ECONOMIC CONTRIBUTION OF COMMUNICATIONS NETWORK INVESTMENT IN ILLINOIS

The State of Illinois has enacted an 8.22% sales tax rate for both telecommunications and cable TV companies. As the fifth highest rate in the Nation, it is estimated to constrain equipment investment significantly.

9.1. The situation of the economy in the state of Illinois:

The state of Illinois ranks 15th in the United States in terms of GDP per capita (see figure 27).

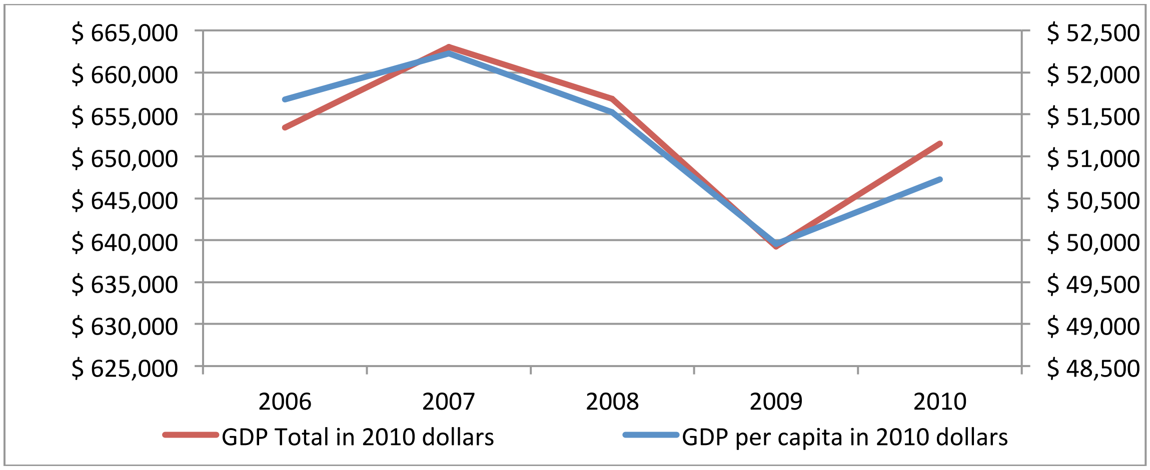
Figure 27. United States: States Ranking by GDP per Capita (2010)



Source: US Census Bureau; TAS analysis

Between 2006 and 2010 the Illinois GDP per capita decreased by 1.84%, while the total GDP decreased by 0.29% (the difference is explained by an increase in total population).

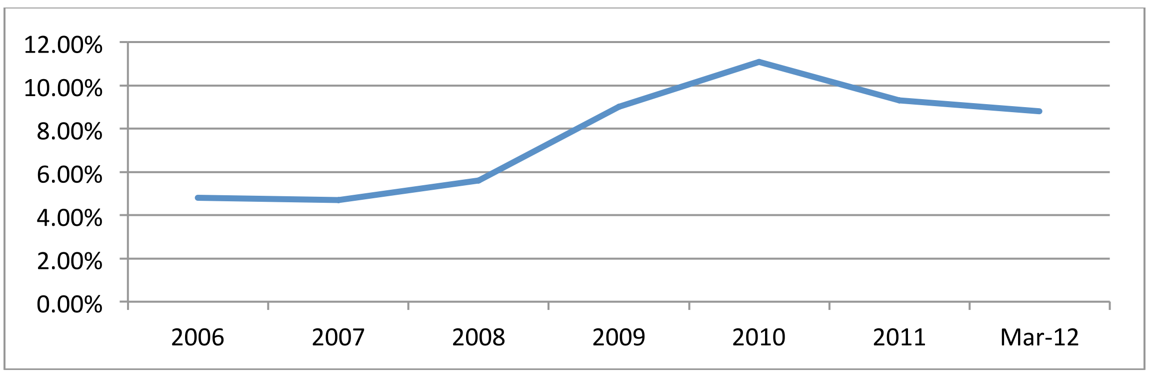
Figure 28. Illinois GDP (2006-2010)



Note: GDP Total in Thousands of 2010 dollars
Source: US Census Bureau; TAS analysis

In March 2012, Illinois´s unemployment rate was 8.80%, which implies that 581,116 individuals of a total labor force of 6,588,762 were unemployed. Unemployment rate has increased between 2007 and 2010 but has slightly declined since then (Figure 29):

Figure 29. Illinois Unemployment Rate (2006-2012)



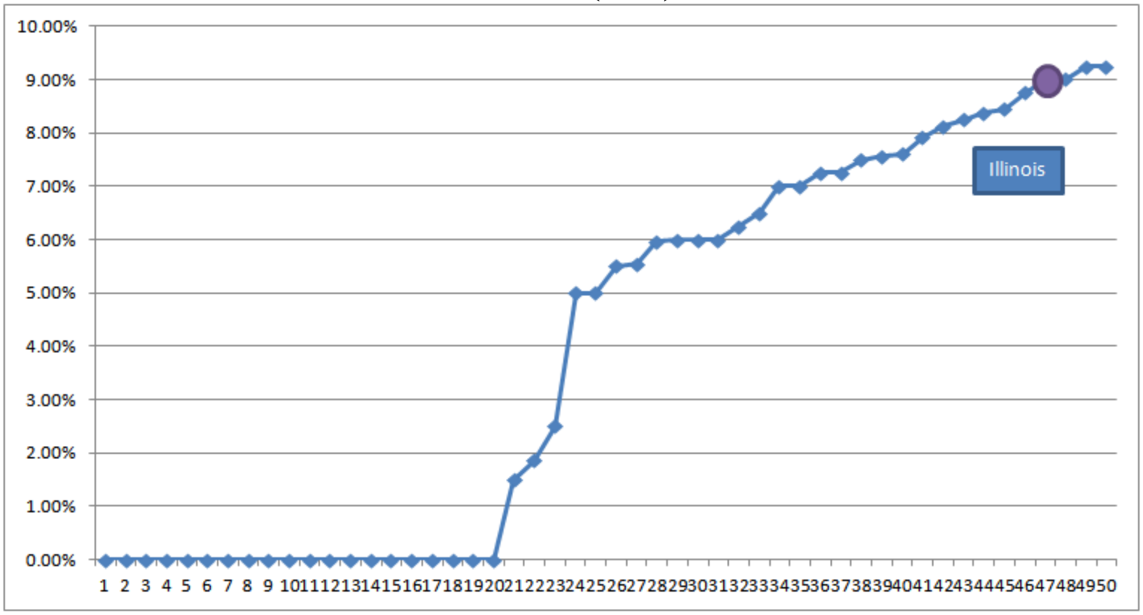
Source: US Census Bureau; TAS analysis

In this context, it is critical to consider public policies that might induce both economic growth and job creation to counter the current trends.

9.2. Current taxation regime on initial equipment purchasing by telecommunications and cable TV operators in Illinois:

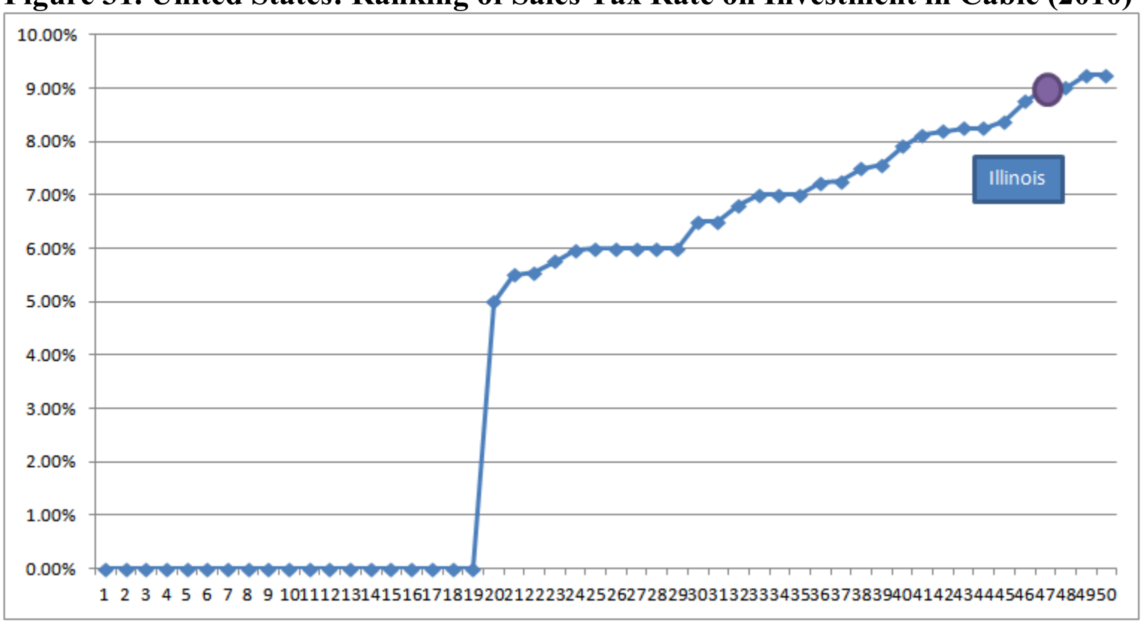
Illinois is one of 30 states that apply a sales tax to telecommunications network equipment and one of 31 states that apply the sales tax on cable network investments. As mentioned above, both cable TV operators and telecommunications companies had to pay a sales tax rate of 8.22% (weighted average combined state-local rate for the state) in 2010. This implies that Illinois has the 5th highest tax rate for wireless and wireline telecommunications of the country and also the 5th highest for cable investment (see figures 30 and 31).

Figure 30. United States: Ranking of Sales Tax Rate on Investment in Wireless & Wireline (2010)



Source: Broadband Tax Institute; TAS analysis

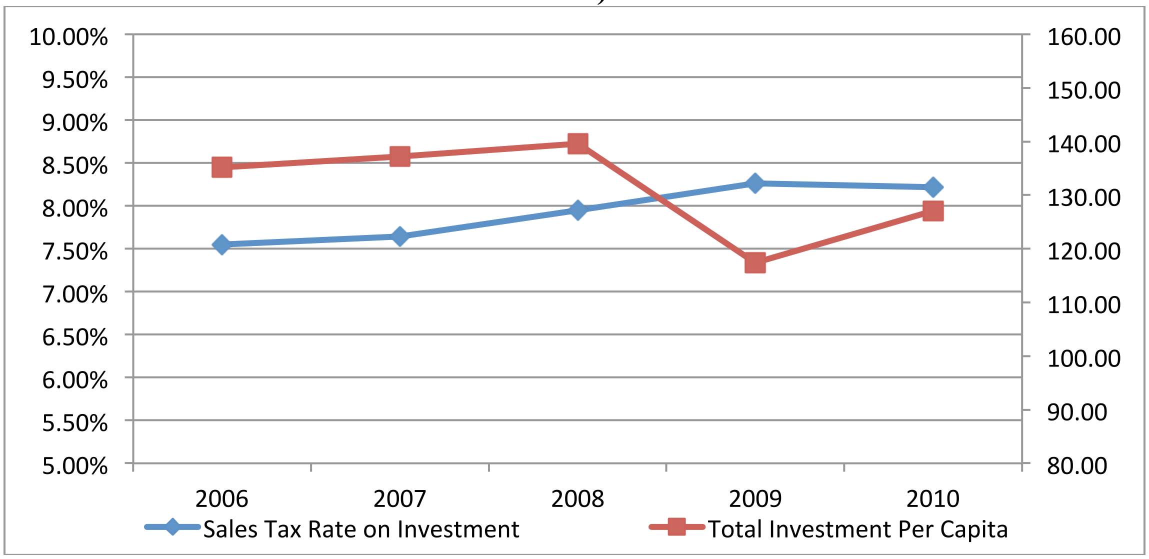
Figure 31. United States: Ranking of Sales Tax Rate on Investment in Cable (2010)



Source: Broadband Tax Institute; TAS analysis

The evolution of sales tax rate on equipment investment and telecommunications and cable TV investment per capita indicates that a persistent relative high tax rate has an increasing impact on investment levels (see figure 32).

Figure 32. Illinois: Evolution of Sales Tax Rate and Investment Per Capita (2006-2010)



Source: Broadband Tax Institute Data; TAS analysis

Illinois increased its state-local taxes from 7.55% to 8.22% in the period under analysis. On the other hand, the level of investment per capita between 2006 and 2010 declined 5.99%. The higher tax rate, coupled with the economic recession of 2009 impacted heavily the level of investment of that year dropping from $139.60 to $117.36 (16 % less in one year)

9.3. Economic impact of communications network equipment taxation in the state of Illinois

By relying on the econometric models presented in section 3.2, the short run and the long run impact of an elimination of the sales tax rate on communications equipment purchases in Illinois was estimated[24].

Assuming that in year 1 the sales tax rate is eliminated, cable TV investment per capita would increase by $ 2.54 (equivalent to 9.46% over the current level of $26.81). In the case of wireline and wireless, the increase in investment would amount to $7.01 per capita (6.99% more than the current level of $100.27). In total, the increase in investment in year 1 would amount to $123 million (or a 7.51% increase of a base of $1,632 million).

However, investment in year 2 would be, to a large degree, dependent on the level in year 1. For example, according to our models, 50.19% of cable TV investment in year 2 is dependent on the investment in year 1, while in the case of the wireless and wireline

[24] To be conservative in the estimations, it was assumed that there is no exogenous growth in the GDP per Capita, in the Population or in the Human Capital, all variables in the econometric models. If such an exogneous growth would take place, the expected results of a reduction in sales taxes would be higher than predicted.

industries, the value is 43.75% As a result, the effect of exempting sales taxes drives not only a short-term but also a long-term effect on investment levels (see table 23).

Table 23. Estimated investment increase as consequence of an elimination of sales taxes in Illinois

	Year 1	Year 2	Year 3	Total
Investment Growth	$ 122,609,956	$ 178,349,229	$ 259,527,128	$ 560,486,313
Savings from Sales Tax Elimination	$ 93,970,324	$ 93,970,324	$ 93,970,324	$ 281,910,972
Share of Savings Reinvested	130.48%	189.79%	276.18%	198.82%

Source: TAS analysis

The projections of table 23 indicate that, as a result of an elimination of the sales tax on initially purchased equipment, in year 1 the cable TV, wireless and wireline operators reinvest 130% of what they would have paid as sales tax, and over the long run they would have the incentive to invest more than what they would have saved. In a period of three years investment would represent 199% of saved taxes. This is validated by the case of North Dakota reviewed in section 3.3.

In turn, this additional investment would generate an impact on the economy of the state. By relying on the coefficients of the econometric models of section 3.2, the following estimates of socio-economic impact were calculated (see table 24).

Table 24. Estimation of Direct and Indirect Socio-Economic impact of eliminating sales tax on telecommunications equipment purchase in Illinois

Economic Indicators	Current Level	Short Run	Long Run
GDP Per Capita	$ 50,729	$ 50,782	$ 50,970
GDP Per Capita Growth	0.00%	0.10%	0.47%
Incremental GDP	$ 0	$ 676,957,730	$ 3,094,573,685
Unemployment Rate	8.82%	8.74%	8.57%
Employment Gained	0	4,981	16,688
Broadband Connections	7,155,000	7,192,415	7,326,034
Broadband Penetration	55.71%	56.00%	57.04%

Source: TAS analysis

The economic analysis based on the models specified shows that eliminating the sales and use tax on communications infrastructure would over three years:

- Generate over $ 3,000 million in new economic activity in Illinois[25];
- Create 16,600 new private sector jobs paying $ 932 million annually in wages[26];

[25] This estimate is calculated by multiplying the additional GDP Per Capita of $241 by Illinois´s population of 12,843,166.

[26] The Bureau of Labor Statistics indicates that the Mean Annual Wage in Illinois is $55,890.

- Generate a conservative estimate of $56 million in new state and local taxes.

Recent studies have shown that the productivity benefits associated with investments in communications networks are broadly distributed across the many businesses, governments, and non-profits that use information technology and communication services. Capital investments made by communications companies improve infrastructure that benefits the entire state of Illinois, not just the companies making the investments. The $3,000 million in new economic activity that would result from the elimination of sales taxes on communications network investments would benefit sectors as diverse as wholesale trade, accounting, finance, building trades, and hospitals.

This proposal would create 16,600 new private sector jobs paying over $932 million annually in wages. The jobs impact would be widespread as new jobs are created not only in the installation of new equipment but also in the many business sectors that rely on communications networks to develop new, more efficient and profitable ways to do business.

The new economic activity will generate substantial offsetting revenues for state and local governments as new employment and economic activity generates income, sales, property, and other tax revenue for governments.

More rapid investment in communications networks will have immediate and direct benefits for consumers as well. New investment will benefit consumers by providing better and faster communications networks. New investments will also accelerate competition between wireless, wireline, and cable providers of high-speed communications services. This competition directly benefits consumers through better services and lower prices.

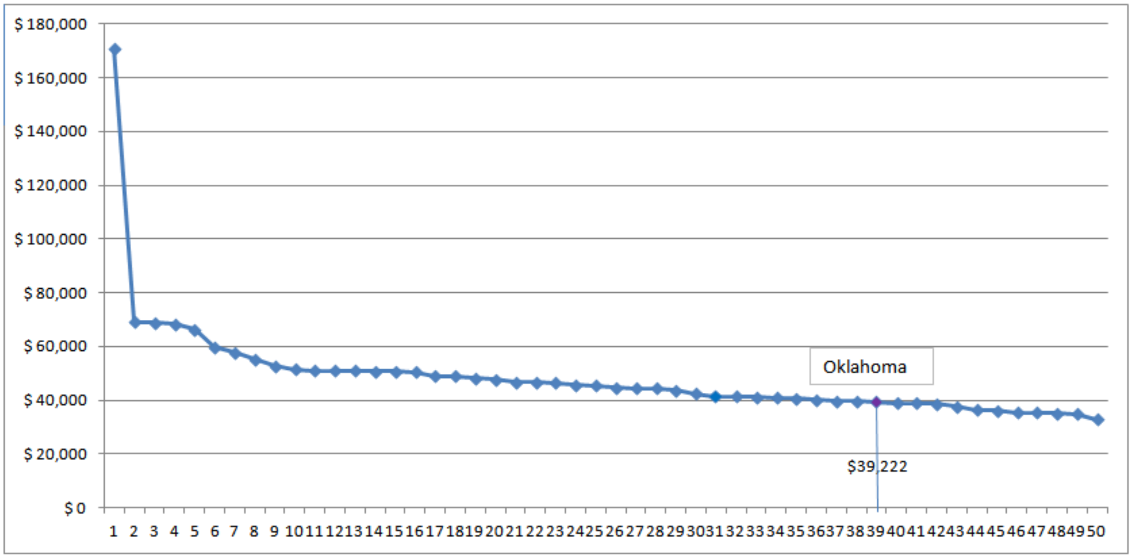
10. THE ECONOMIC CONTRIBUTION OF COMMUNICATIONS NETWORK INVESTMENT IN OKLAHOMA

Oklahoma exhibits a tax situation opposite to New York in terms of telecommunications carriers having to pay sales taxes on equipment, from which the cable TV players are exempted. Wireless and wireline companies have to pay in concept of sales tax 8.45% of the capital invested in purchasing network equipment.

10.1. The situation of the economy in Oklahoma:

The state of Oklahoma ranks 39th in the United States in terms of GDP per capita (see figure 33).

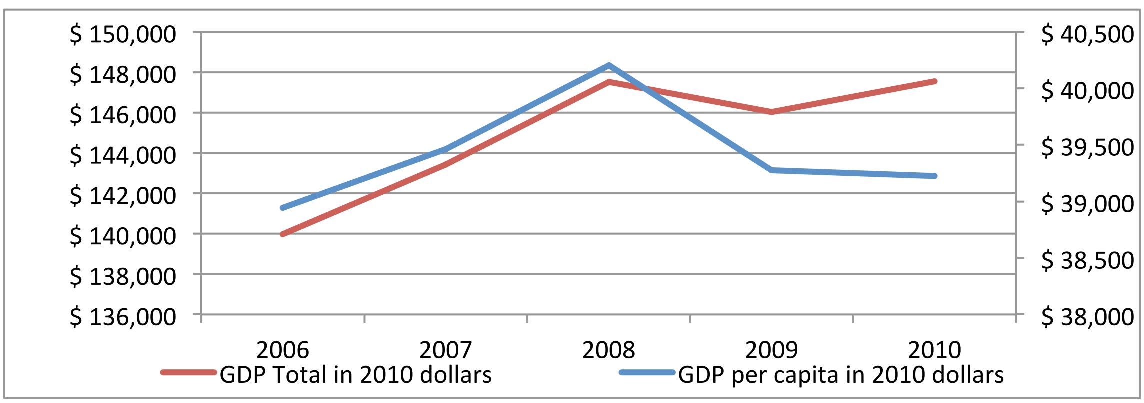
Figure 33. United States: States Ranking by GDP per Capita (2010)



Source: US Census Bureau; TAS analysis

Between 2006 and 2010 the Oklahoma GDP per capita grew by 0.72%, while the total GDP increased by 5.41% (the difference is explained by an increase in total population).

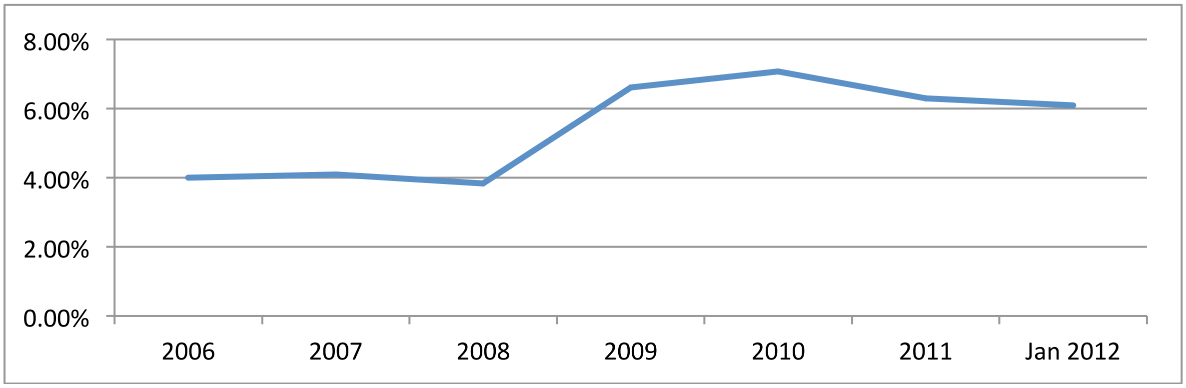
Figure 34. Oklahoma GDP (2006-2010)



Note: GDP Total in Thousands of 2010 dollars
Source: US Census Bureau; TAS analysis

In January 2012, Oklahoma´s unemployment rate was 6.10%, which implies that 109,064 individuals of a total labor force of 1,784,846 were unemployed. Unemployment rate has increased since 2008, but slightly declined since 2010 (Figure 35):

Figure 35. Oklahoma Unemployment Rate (2006-2012)



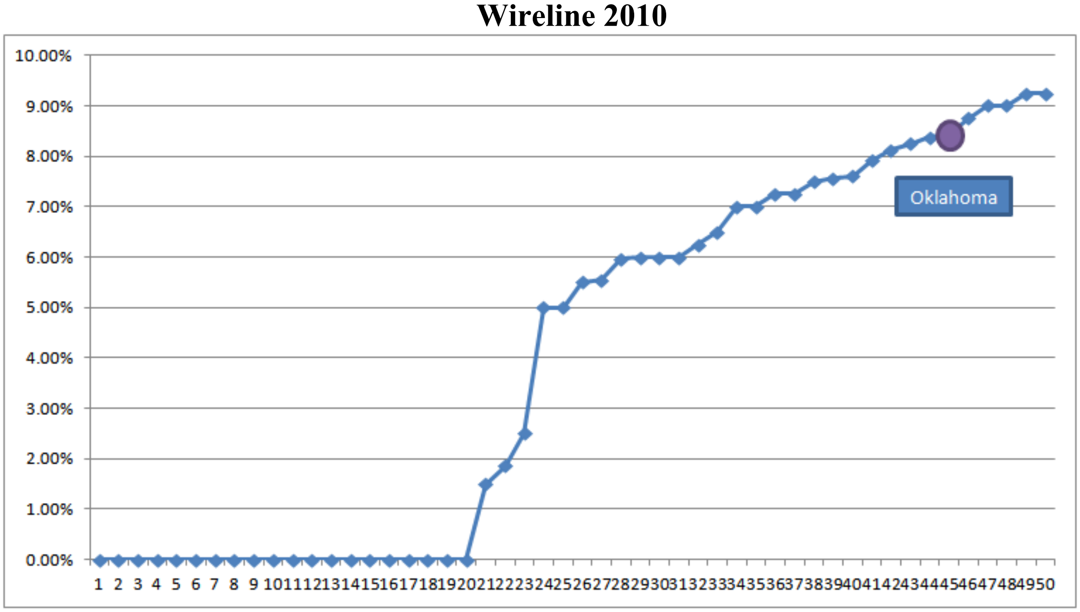
Source: US Census Bureau; TAS analysis

In this context, it is critical to consider public policies that might induce both economic growth and job creation to counter the current trends.

10.2. Current taxation regime on initial equipment purchasing by communications companies in Oklahoma:

Oklahoma is one of 30 states that apply a sales tax to telecommunications network equipment and one of 19 states that do not apply the sales tax on cable network investments. Wireline and wireless companies have to pay a sales tax rate of 8.45% (weighted average combined state-local rate for the state) in 2010. As a result, Oklahoma has the 6th highest tax rate for wireless and wireline telecommunications investment in the nation (see figure 36).

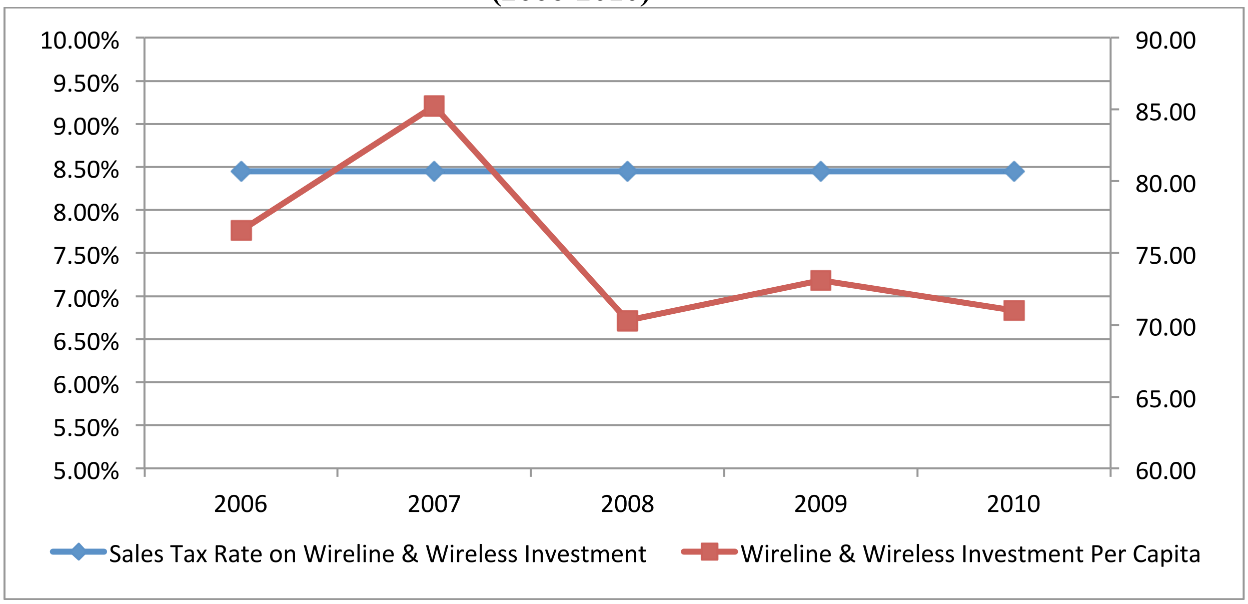
Figure 36. United States: Ranking of Sales Tax Rate on Investment in Wireless & Wireline 2010



Source: Broadband Tax Institute; TAS analysis

The evolution of sales tax rate on telecommunications equipment investment and communications investment per capita is represented in figure 37.

Figure 37. Oklahoma: Evolution of Sales Tax Rate and Investment Per Capita (2006-2010)



Source: Broadband Tax Institute Data; TAS analysis

Between 2006 and 2010 the sales tax rate on wireline and wireless equipment purchases has not changed. At the same time, the investment per capita in wireless and wireline has decreased from $76.58 in 2006 to $70.99 in 2010 (7% less in five years).

10.3. Economic impact of communications network equipment taxation in Oklahoma

By relying on the econometric models presented in section 3.2, the short run and the long run impact of an elimination of the sales tax rate in Oklahoma was estimated[27]. Assuming that in year 1 the sales tax rate is eliminated, wireline and wireless investment per capita would increase by $ 7.21 (equivalent to 10.15% over the current level of $70.99). In total, the increase in investment in year 1 would amount to $27 million (or a 9.43% increase of a base of $280 million).

Furthermore, investment in year 2 would be, to a large degree, dependent on the level in year 1. For example, according to our models, 43.75% of wireless and wireline investment in year 2 is dependent on the investment in year 1. As a result, the effect of an elimination of sales taxes produces not only a short-term but also a long-term effect on investment levels (see table 25).

[27] To be conservative in the estimations, it was assumed that there is no exogenous growth in the GDP per Capita, in the Population or in the Human Capital, all variables in the econometric models. If such an exogneous growth would take place, the expected results of a reduction in sales taxes would be higher than predicted.

Table 25. Estimations of the Growth in Investment as consequence of an elimination of the sales Tax Rate in Oklahoma

	Year 1	Year 2	Year 3	Total
Investment Growth	$ 27,110,605	$ 38,971,495	$ 56,021,524	$ 122,103,624
Savings from Sales Tax Elimination	$ 15,793,591	$ 15,793,591	$ 15,793,591	$ 47,380,774
Share of Savings Reinvested	171.66%	246.76%	354.71%	257.71%

Source: TAS analysis

The projections of table 25 indicate that, as a result of an elimination of the sales tax on initially purchased equipment, in year 1 the wireless and wireline operators reinvest 171% of what they would have paid as sales tax, and over the long run they would have the incentive to invest more than what they would have saved. In a period of three years investment would represent 258% of saved taxes.

In turn, this additional investment would generate an impact on the economy of the state. By relying on the coefficients of the econometric models of section 3.2, the following estimates of socio-economic impact were calculated (see table 26).

Table 26. Estimation of Direct and Indirect Socio-Economic impact of eliminating sales tax on telecommunications equipment purchase in Oklahoma

Economic Indicators	Current Level	Short Run	Long Run
GDP Per Capita	$ 39,222	$ 39,274	$ 39,453
GDP Per Capita Growth	0.00%	0.13%	0.59%
Incremental GDP	$ 0	$ 192,462,665	$ 866,833,798
Unemployment Rate	6.10%	6.03%	5.88%
Jobs created	0	1,172	3,873
Broadband Connections	1,995,000	2,008,097	2,053,987
Broadband Penetration	53.03%	53.38%	54.60%

Source: TAS analysis

The economic analysis based on the models specified shows that eliminating the sales and use tax on communications infrastructure would over three years:

- Generate over $ 866 million in new economic activity in Oklahoma[28];
- Create 3,850 new private sector jobs paying 137,000,000 annually in wages[29];
- Generate a conservative estimate of $16 million in new state and local taxes.

In summary, capital investments made by communications companies improve infrastructure that benefits the entire state of Oklahoma, not just the companies making the investments. The $866 million in new economic activity that would result from the

[28] This estimate is calculated by multiplying the additional GDP Per Capita of $230 by Oklahoma´s population of 3,761,702.

[29] The Bureau of Labor Statistics indicates that the Mean Annual Wage in Oklahoma is $35,396.

elimination of sales taxes on communications network investments would benefit sectors as diverse as wholesale trade, professional service, and health care.

This proposal would create 3,850 new private sector jobs paying over $137 million annually in wages. The jobs impact would be widespread as new jobs are created not only in the installation of new equipment but also in the many business sectors that rely on communications networks to develop new, more efficient and profitable ways to do business. The new economic activity will generate substantial offsetting revenues for state and local governments as new employment and economic activity generates income, sales, property, and other tax revenue for governments.

More rapid investment in communications networks will have immediate and direct benefits for consumers as well. New investment will benefit consumers by providing better and faster communications networks. New investments will also accelerate competition between wireless, wireline, and cable providers of high-speed communications services. This competition directly benefits consumers through better services and lower prices.

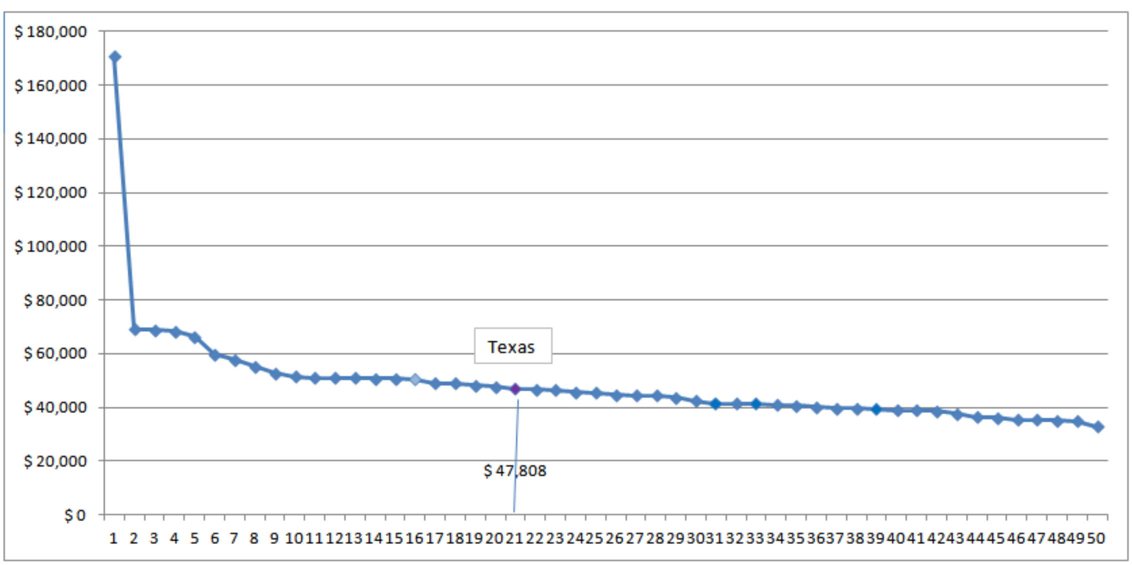
11. THE ECONOMIC CONTRIBUTION OF COMMUNICATIONS NETWORK INVESTMENT IN TEXAS

Texas is another state that has enacted a sales tax of 8.25% for both telecommunication and cable investment.

11.1. The situation of the economy in Texas:

The state of Texas ranks 20th in the United States in terms of GDP per capita (see figure 38).

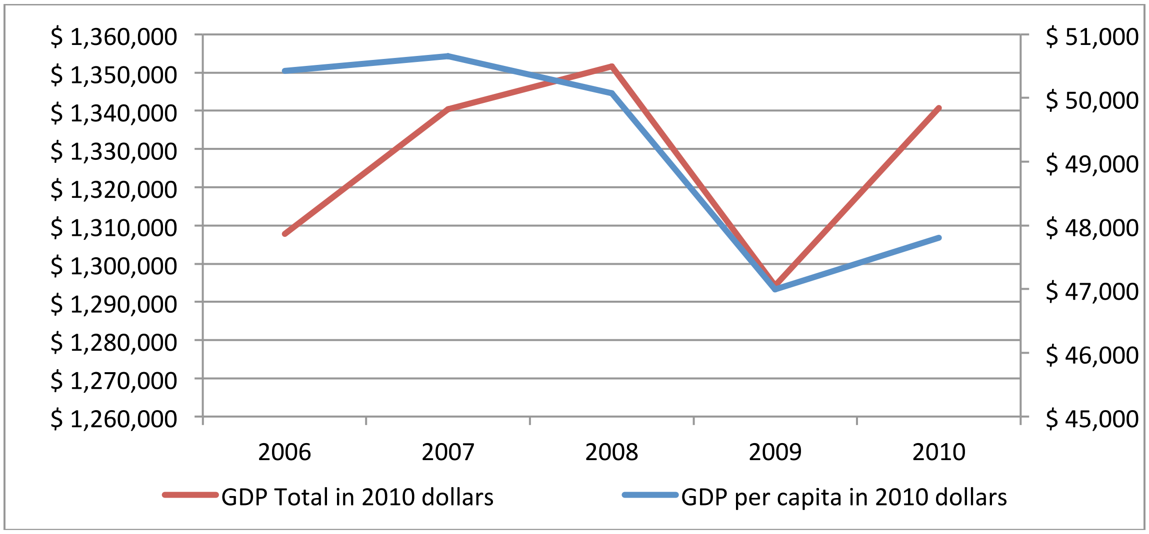
Figure 38. United States: States Ranking by GDP per Capita (2010)



Source: US Census Bureau; TAS analysis

Between 2006 and 2010 the Texas GDP per capita declined by 5.18%, while the total GDP grew by 2.52% (the difference is explained by an important increase in total population).

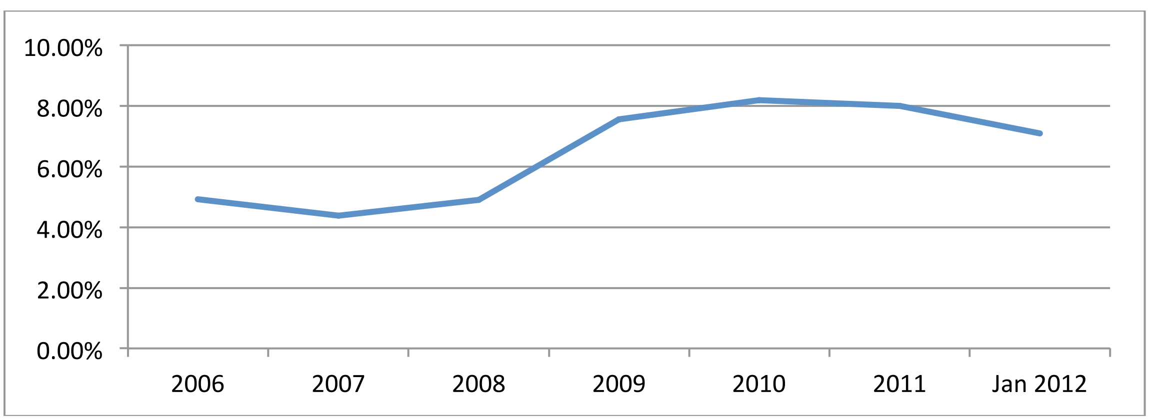
Figure 39. Texas GDP (2006-2010)



Note: GDP Total in Thousands of 2010 dollars
Source: US Census Bureau; TAS analysis

In January 2012, Texas´s unemployment rate was 7.10%, which implies that 891,600 individuals of a total labor force of 12,518,200 were unemployed. Unemployment rate has increased between 2007 and 2010, but has declined 1 percentage point since (Figure 40):

Figure 40. Texas Unemployment Rate (2006-2012)



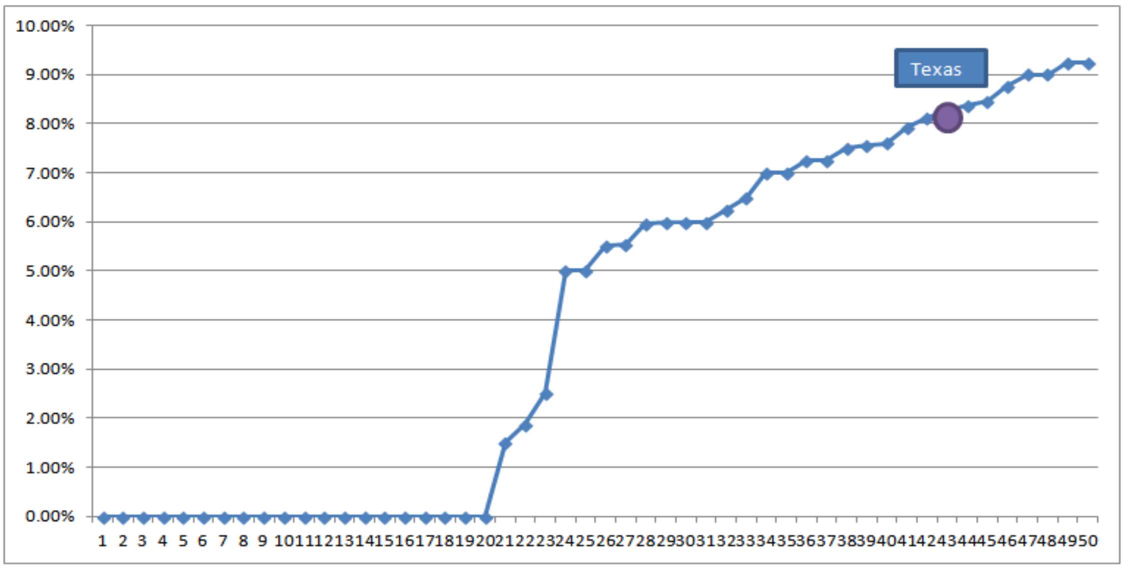
Source: US Census Bureau; TAS analysis

In this context, it is critical to consider public policies that might induce both economic growth and job creation to counter the current trends.

11.2. Current taxation regime on initial equipment purchasing by telecommunications and cable TV operators in Texas:

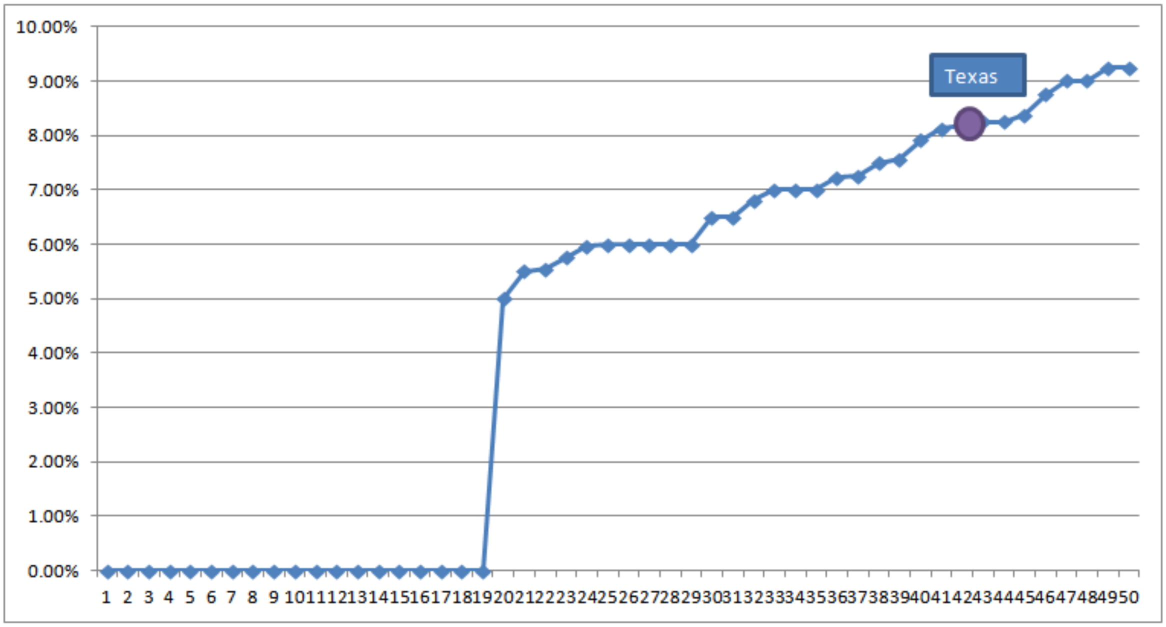
Texas is one of 30 states that apply a sales tax to telecommunications network equipment and one of 31 states (plus the District of Columbia) that apply the sales tax on cable network investments. As mentioned above, in 2010 communications equipment investment was taxed at 8.25% (weighted average combined state-local rate for the state) in 2010. This implies that Texas has the 8th highest tax rate for wireless and wireline telecommunications of the country and the 7th highest for cable investment (see figures 41 and 42).

Figure 41. Ranking of Sales Tax Rate on Investment in Wireless & Wireline 2010



Source: Broadband Tax Institute; TAS analysis

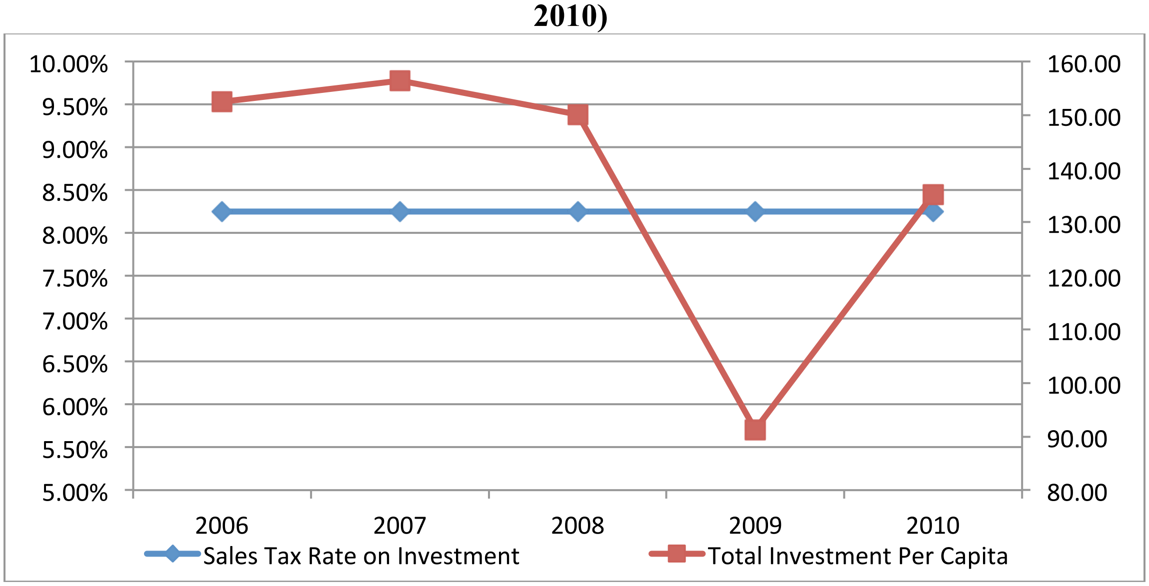
Figure 42. Ranking of Sales Tax Rate on Investment in Cable 2010



Source: Broadband Tax Institute; TAS analysis

The evolution of sales tax rate on equipment investment and telecommunications and cable TV investment per capita is shown in figure 43.

Figure 43. Texas: Evolution of Sales Tax Rate and Investment Per Capita (2006-2010)



Source: Broadband Tax Institute Data; TAS analysis

Texas exhibits in the period under analysis a stable sales tax rate of 8.25%. On the other hand, the investment per capita decreased significantly in 2009 (from an investment per capita of $150.12 to $91.30) and has slightly recovered in 2010 reaching a level of $135.17.

11.3. Economic impact of communications network equipment taxation in Texas

By relying on the econometric models presented in section 3.2, the short run and the long run impact of an elimination of the sales tax rate in Texas was estimated[30]. Assuming that in year 1 the sales tax rate is eliminated, cable TV investment per capita would increase by $ 2.55 (equivalent to 7.72% over the current level of $32.95). In the case of wireline and wireless, the increase in investment would amount to $7.04 per capita (6.88% more than the current level of $102.22). In total, the increase in investment in year 1 would amount to $242 million (or a 7.09% increase of a base of $3,414 million).

However, investment in year 2 would be, to a large degree, dependent on the level in year 1. For example, according to our models, 50.19% of cable TV investment in year 2 is dependent on the investment in year 1, while in the case of the wireless and wireline industries, the value is 43.75% As a result, the effect of an elimination of sales taxes results not only in a short-term but also a long-term effect on investment levels (see table 27).

Table 27. Estimations of the Growth in Investment as consequence of an elimination of the sales Tax Rate in Texas

	Year 1	Year 2	Year 3	Total
Investment Growth	$ 242,002,301	$ 352,018,101	$ 512,243,576	$ 1,106,263,978
Savings from Sales Tax Elimination	$ 196,597,026	$ 196,597,026	$ 196,597,026	$ 589,791,078
Share of Savings Reinvested	123.10%	179.06%	260.56%	187.57%

Source: TAS analysis

The projections of table 27 indicate that, as a result of an elimination of the sales tax on initially purchased equipment, in year 1 the cable TV, wireless and wireline operators would reinvest 123% of what they would have paid as sales tax, and over the long run they would have the incentive to invest more than what they would have saved. In a period of three years investment would represent 188% of saved taxes. This is validated by the case of North Dakota reviewed in section 3.3.

In turn, this additional investment would generate an impact on the economy of the state. By relying on the coefficients of the econometric models of section 3.2, the following estimates of socio-economic impact were calculated (see table 28).

[30] To be conservative in the estimations, it was assumed that there is no exogenous growth in the GDP per Capita, in the Population or in the Human Capital, all variables in the econometric models. If such an exogneous growth would take place, the expected results of a reduction in sales taxes would be higher than predicted.

Table 28. Estimation of Direct and Indirect Socio-Economic impact of eliminating sales tax on telecommunications equipment purchase in Texas

Economic Indicators	Current Level	Short Run	Long Run
GDP Per Capita	$ 47,808	$ 47,855	$ 48,022
GDP Per Capita Growth	0.00%	0.10%	0.45%
Incremental GDP	$ 0	$ 1,183,849,454	$ 5,411,725,436
Unemployment Rate	7.10%	7.04%	6.91%
Jobs created	0	7,189	24,083
Broadband Connections	14,482,000	14,553,456	14,808,647
Broadband Penetration	57.34%	57.62%	58.63%

Source: TAS analysis

The economic analysis based on the models specified shows that eliminating the sales and use tax on communications infrastructure would over three years:

- Generate over $5,400 million in new economic activity in Texas[31];
- Create 24,000 new private sector jobs paying 1,030,000,000 annually in wages[32];
- Generate a conservative estimate of $97 million in new state and local taxes.

Recent studies have shown that the productivity benefits associated with investments in communications networks are broadly distributed across the many businesses, governments, and non-profits that use information technology and communication services. Capital investments made by communications companies improve infrastructure that benefits the entire state of Texas, not just the companies making the investments. The $5,400 million in new economic activity that would result from the elimination of sales taxes on communications network investments would benefit sectors as diverse as wholesale trade, accounting, finance, building trades, and hospitals.

This proposal would create 24,000 new private sector jobs paying over $1,030 million annually in wages. The jobs impact would be widespread as new jobs are created not only in the installation of new equipment but also in the many business sectors that rely on communications networks to develop new, more efficient and profitable ways to do business. The new economic activity will generate substantial offsetting revenues for state and local governments as new employment and economic activity generates income, sales, property, and other tax revenue for governments.

More rapid investment in communications networks will have immediate and direct benefits for consumers as well. New investment will benefit consumers by providing better and faster communications networks. New investments will also accelerate competition between wireless, wireline, and cable providers of high-speed

[31] This estimate is calculated by multiplying the additional GDP Per Capita of $214 by Texas´s population of 25,257,114

[32] The Bureau of Labor Statistics indicates that the Mean Annual Wage in Texas is $43,090

communications services. This competition directly benefits consumers through better services and lower prices.

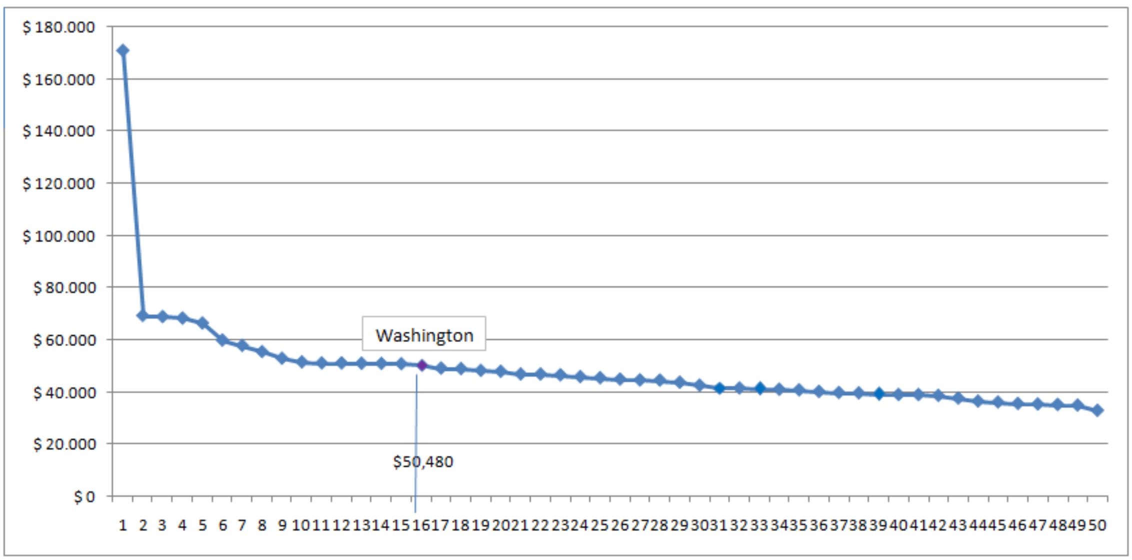
12. THE ECONOMIC CONTRIBUTION OF COMMUNICATIONS NETWORK INVESTMENT IN WASHINGTON

The State of Washington has enacted a 9.00% sales tax rate for both telecommunications and cable TV companies. As the second highest rate in the Nation, it is estimated to constrain equipment investment significantly.

12.1. The situation of the economy in the state of Washington:

The state of Washington ranks 16th in the United States in terms of GDP per capita (see figure 44).

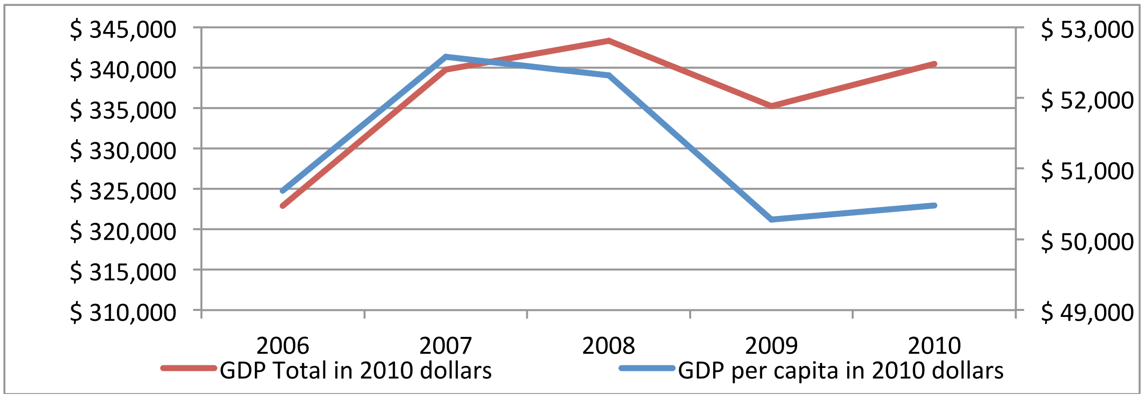
Figure 44. United States: States Ranking by GDP per Capita (2010)



Source: US Census Bureau; TAS analysis

Between 2006 and 2010 the Washington GDP per capita decreased by 0.40%, while the total GDP grew by 5.44% (the difference is explained by an increase in total population).

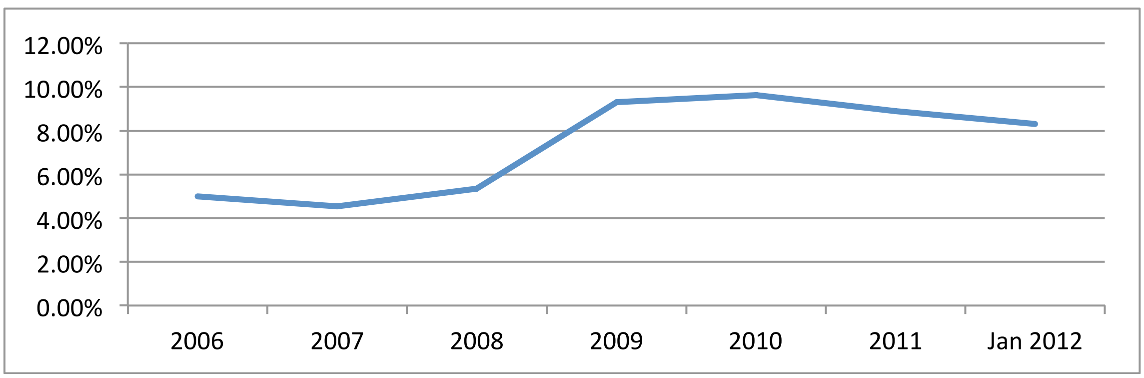
Figure 45. Washington GDP (2006-2010)



Note: GDP Total in Thousands of 2010 dollars
Source: US Census Bureau; TAS analysis

In January 2012, Washington´s unemployment rate was 8.30%, which implies that 291,443 individuals of a total labor force of 3,490,872 were unemployed. Unemployment rate has increased between 2007 and 2010 but has slightly declined since then (Figure 46):

Figure 46. Washington Unemployment Rate (2006-2012)



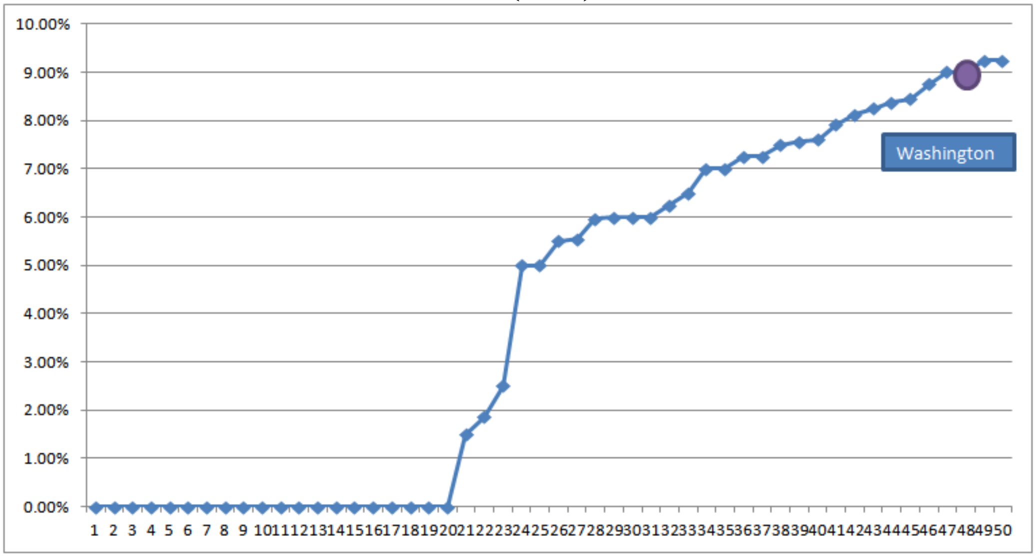
Source: US Census Bureau; TAS analysis

In this context, it is critical to consider public policies that might induce both economic growth and job creation to counter the current trends.

12.2. Current taxation regime on initial equipment purchasing by telecommunications and cable TV operators in Washington:

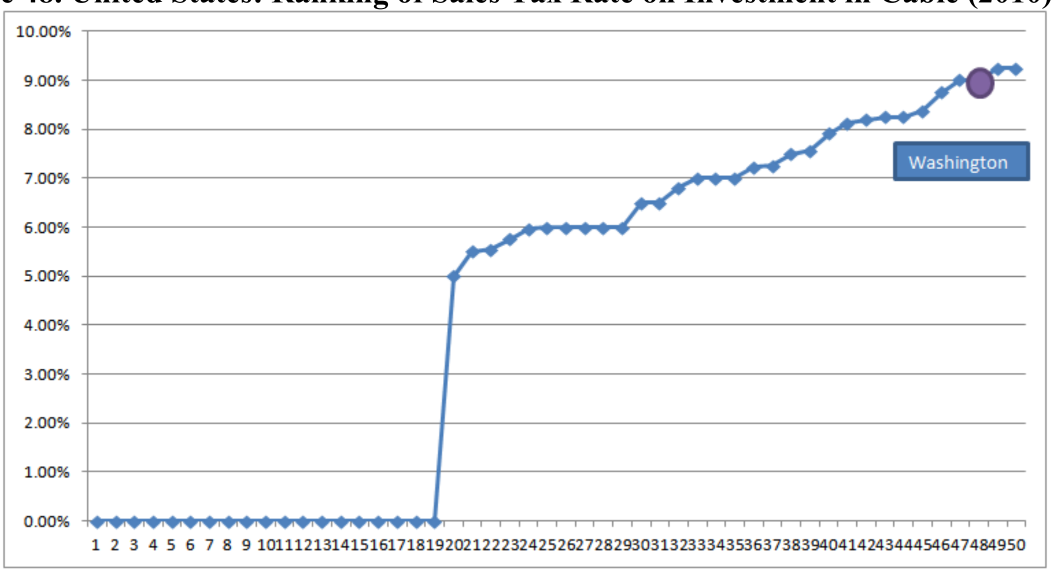
Washington is one of 30 states that apply a sales tax to telecommunications network equipment and one of 31 states that apply the sales tax on cable network investments. As mentioned above, both cable TV operators and telecommunications companies had to pay a sales tax rate of 9.00% (weighted average combined state-local rate for the state) in 2010. This implies that Washington has the 3rd highest tax rate for wireless and wireline telecommunications of the country and also the 3th highest for cable investment (see figures 47 and 48).

Figure 47. United States: Ranking of Sales Tax Rate on Investment in Wireless & Wireline (2010)



Source: Broadband Tax Institute; TAS analysis

Figure 48. United States: Ranking of Sales Tax Rate on Investment in Cable (2010)

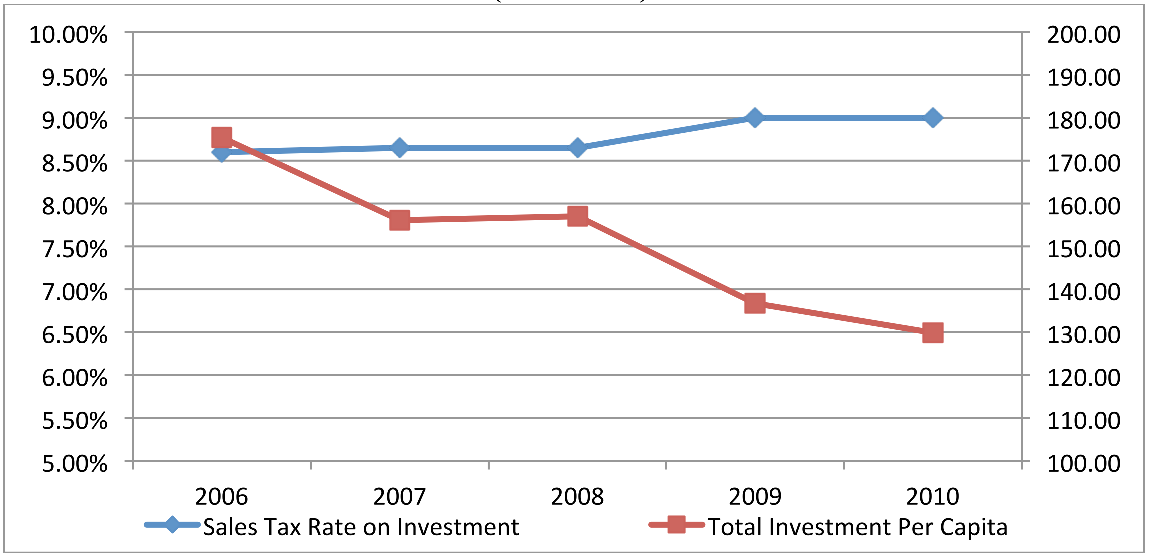


Source: Broadband Tax Institute; TAS analysis

As a result of this rate, telecommunications and cable companies paid approximately $55 million in sales taxes on their network investments in 2010 alone.

The evolution of sales tax rate on equipment investment and telecommunications and cable TV investment per capita indicates that a persistent relative high tax rate has an increasing impact on investment levels (see figure 49).

Figure 49. Washington: Evolution of Sales Tax Rate and Investment Per Capita (2006-2010)



Source: Broadband Tax Institute Data; TAS analysis

Washington increased its state-local taxes from 8.60% to 9.00% in the period under analysis. On the other hand, the level of investment per capita is declining year after year, magnified by the inertia effect in capital planning. The declining tendency started in 2006 when the investment per capita amounted to $175.34 per capita. Over time, this amount was reduced to $129.92 per capita (26% less in five years).

12.3. Economic impact of communications network equipment taxation in the state of Washington

By relying on the econometric models presented in section 3.2, the short run and the long run impact of an elimination of the sales tax rate in Washington was estimated[33]. Assuming that in year 1 the sales tax rate is eliminated, cable TV investment per capita would increase by $ 2.78 (equivalent to 8.16% over the current level of $34.03). In the case of wireline and wireless, the increase in investment would amount to $7.68 per capita (8.01% more than the current level of $95.89). In total, the increase in investment in year 1 would amount to $70 million (or a 8.05% increase of a base of $876 million).

However, investment in year 2 would be, to a large degree, dependent on the level in year 1. For example, according to our models, 50.19% of cable TV investment in year 2 is dependent on the investment in year 1, while in the case of the wireless and wireline industries, the value is 43.75% As a result, the effect of exempting sales taxes produces not only a short-term but also a long-term effect on investment levels (see table 29).

[33] To be conservative in the estimations, it was assumed that there is no exogenous growth in the GDP per Capita, in the Population or in the Human Capital, all variables in the econometric models. If such an exogneous growth would take place, the expected results of a reduction in sales taxes would be higher than predicted.

Table 29. Estimated investment increase as consequence of an elimination of sales taxes in Washington

	Year 1	Year 2	Year 3	Total
Investment Growth	$ 70,497,519	$ 102,546,144	$ 149,221,314	$ 322,264,976
Savings from Sales Tax Elimination	$ 55,334,410	$ 55,334,410	$ 55,334,410	$ 166,003,230
Share of Savings Reinvested	127.40%	185.32%	269.67%	194.13%

Source: TAS analysis

The projections of table 31 indicate that, as a result of an elimination of the sales tax on initially purchased equipment, in year 1 the cable TV, wireless and wireline operators reinvest 127% of what they would have paid as sales tax, and over the long run they would have the incentive to invest more than what they would have saved. In a period of three years investment would represent 194% of saved taxes. This is validated by the case of North Dakota reviewed in section 3.3.

In turn, this additional investment would generate an impact on the economy of the state. By relying on the coefficients of the econometric models of section 3.2, the following estimates of socio-economic impact were calculated (see table 30).

Table 30. Estimation of Direct and Indirect Socio-Economic impact of eliminating sales tax on telecommunications equipment purchase in Washington

Economic Indicators	Current Level	Short Run	Long Run
GDP Per Capita	$ 50,480	$ 50,536	$ 50,736
GDP Per Capita Growth	0.00%	0.11%	0.51%
Incremental GDP	$ 0	$ 378,853,353	$ 1,731,850,550
Unemployment Rate	8.30%	8.22%	8.04%
Employment Gained	0	2,660	8,911
Broadband Connections	4,008,000	4,030,446	4,110,606
Broadband Penetration	59.43%	59.76%	60.95%

Source: TAS analysis

The economic analysis based on the models specified shows that eliminating the sales and use tax on communications infrastructure would over three years:

- Generate over $1,731 million in new economic activity in Washington[34];
- Create 8,900 new private sector jobs paying 379,000,000 annually in wages[35];
- Generate a conservative estimate of $34 million in new state and local taxes.

[34] This estimate is calculated by multiplying the additional GDP Per Capita of $257 by Washington´s population of 6,744,496.

[35] The Bureau of Labor Statistics indicates that the Mean Annual Wage in Washington is $42,570.

Recent studies have shown that the productivity benefits associated with investments in communications networks are broadly distributed across the many businesses, governments, and non-profits that use information technology and communication services. Capital investments made by communications companies improve infrastructure that benefits the entire state of Washington, not just the companies making the investments. The $1,731 million in new economic activity that would result from the elimination of sales taxes on communications network investments would benefit sectors as diverse as wholesale trade, accounting, finance, building trades, and hospitals.

This proposal would create 8,900 new private sector jobs paying over $379 million annually in wages. The jobs impact would be widespread as new jobs are created not only in the installation of new equipment but also in the many business sectors that rely on communications networks to develop new, more efficient and profitable ways to do business.

The new economic activity will generate substantial offsetting revenues for state and local governments as new employment and economic activity generates income, sales, property, and other tax revenue for governments.

More rapid investment in communications networks will have immediate and direct benefits for consumers as well. New investment will benefit consumers by providing better and faster communications networks. New investments will also accelerate competition between wireless, wireline, and cable providers of high-speed communications services. This competition directly benefits consumers through better services and lower prices.

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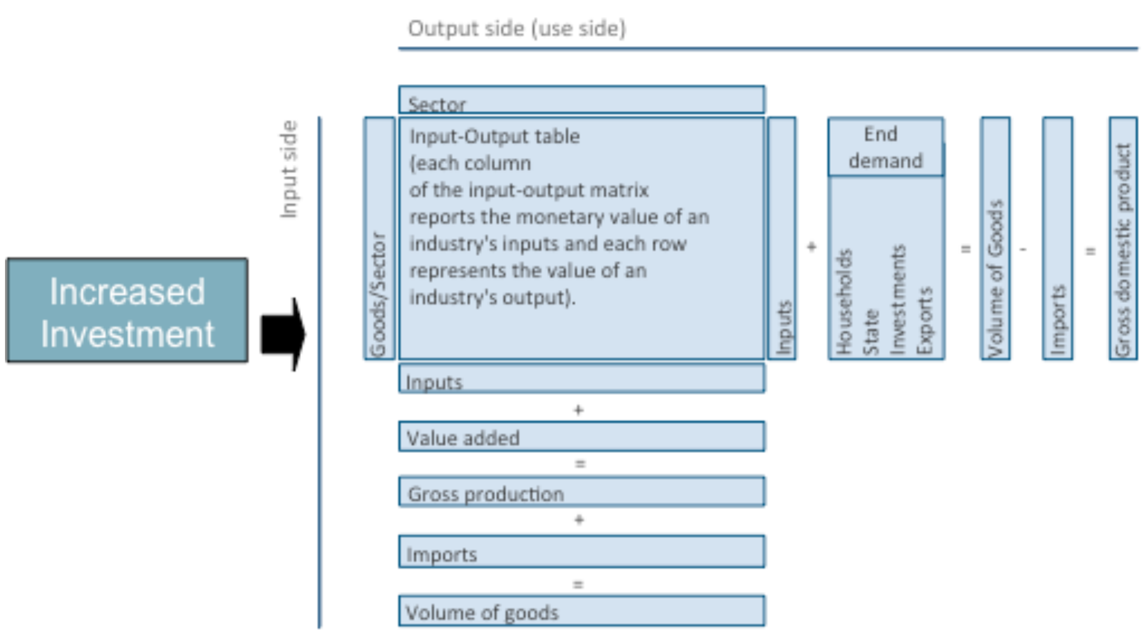
APPENDICES

Appendix A. Input / Output Methodology

This methodology focuses on determining how much value added and employment is generated through the investment in communications networks. Input-output tables enable the calculation of the impact of additional inputs in specific sectors on the economy as a whole. The relationships between the sectors at the inputs stage trigger additional demand and thus increase production in other sectors. The sum of all these effects is the multiplier for the total volume of goods. Multipliers can be calculated in several ways and also for several economic dimensions. There are, for example, goods-related multipliers for the total volume of goods in an economy, for the value of total production or for the value added. There are also multipliers for labor market parameters such as the size of the workforce or the number of hours worked.

Once the investment input is calculated, the estimation of employment and output effects can be done. Input-output tables help calculating the direct, indirect, and induced effects of broadband network construction on employment and production. The interrelationship of these three effects can be measured through multipliers, which estimate how one unit change on the input side affects total employment change throughout the economy (see figure A.1).



To calculate employment effects resulting from communications investment, we relied on the input-output matrix published by Bureau of Economic Analysis. However, in order to be utilized in this analysis, the input-output matrices needed to be formatted to calculate the employment multipliers. Once the table is reformatted, one calculates the multipliers. From the I/O-table it is possible to obtain multipliers for total industry supply and additional variables as value added and employment. The calculation of the multipliers for the total industry supply uses the direct requirement table, which is also called Leontief-Inverse. The direct requirement table (DR) is calculated by the following formula:

$$DR = (I - A)^{-1} \text{ with } A = \text{I/O-table / total industry supply}$$

(division of each cell of intermediate domestic supply by total industry supply) I = Identity matrix

The sum of the columns per industry reflects the increase of the total industry supply by one additional unit of demand in this specific sector. A correction for the share of imports on total industry supply results in the total domestic production of the industries. The multiplying of the share of value added of total domestic industry production results in the value added multiplier. Using labor productivities it is possible to calculate the job effects now. The I/O-table was built based on the Bureau of Economic Analysis (BEA) make- and use-tables using a methodology from Chamberlain Economics LLC. To obtain an I/O-table that can be used to calculate multipliers that reflect domestic production it is necessary to exclude imports from the make- table. The resulting I/O-table from BEA data has the dimension of 133*133 industries.

Appendix B. Models to calculate indirect economic impact of cable TV and telecommunications 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

Appendix C. Model to calculate impact of incremental investment in broadband penetration

Model of Impact of Investment Growth on Broadband Penetration Growth
OLS model with robust errors

Dependent Variable: Broadband Penetration Growth
Independent Variable: Investment Growth, Broadband Penetration (2006), Human Capital

Sample	Full Sample		Low Penetration		High Penetration	
Investment Growth	0.0696075	**	0.1345359	***	-0.0918235	
	(0.0416398)		(0.0411114)		(0.0917503)	
Broadband Penetration (2006)	-1.941815	***	-2.145036	**	-1.375086	
	(0.5789717)		(0.9256655)		(1.05354)	
Human Capital	99.6694	**	26.46527		110.3563	**
	(53.57304)		(55.96668)		(62.44119)	
Constant	42.03752	***	62.70634	***	25.56614	
	(7.879832)		(9.210151)		(21.87777)	
R^2 adjusted	0.1101		0.1431		0.1344	
F	5.97		5.91		1.15	
Prob > F	0.0007		0.0011		0.3355	
Number of Observations	150		78		72	

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

Appendix D. Robustness Tests of Econometric Analysis

Three tests were conducted:

- Run the models excluding the states with the highest standard deviation along the five years under study
- Run the models weighting the sample of states by population size
- Include a year's dummy variable to determine if the investment level is affected by variables not captured in state fixed effects (e.g. recession)

First test: the states with highest standard deviation in investment levels were identified and excluded from the sample, assuming that their investment was driven by factors other than sales tax rate on initial equipment purchasing (see table A.1)

Table A.1. State Total Investment level Standard Deviation (2006-10)

State	Std. Dev. Total Investment Per Capita	Std. Dev. Cable Investment Per Capita	Std. Dev. Wireline & Wireless Investment Per Capita	State	Std. Dev. Total Investment Per Capita	Std. Dev. Cable Investment Per Capita	Std. Dev. Wireline & Wireless Investment Per Capita
Alaska	$ 271.95	$ -	$ 271.95	Montana	$ 35.82	$ 2.58	$ 33.59
Alabama	$ 15.23	$ 5.47	$ 14.30	North Carolina	$ 9.77	$ 18.29	$ 15.61
Arkansas	$ 21.97	$ 4.76	$ 18.16	North Dakota	$ 44.12	$ -	$ 44.12
Arizona	$ 5.44	$ 0.90	$ 5.08	Nebraska	$ 9.58	$ 1.94	$ 10.61
California	$ 19.74	$ 6.29	$ 14.19	New Hampshire	$ 62.96	$ 18.48	$ 46.17
Colorado	$ 23.68	$ 9.04	$ 19.55	New Jersey	$ 32.68	$ 16.58	$ 30.63
Connecticut	$ 16.15	$ 9.05	$ 9.22	New Mexico	$ 12.31	$ 2.64	$ 12.06
District of Colum	$ 34.01	$ 6.95	$ 32.79	Nevada	$ 5.73	$ 2.00	$ 7.60
Delaware	$ 57.36	$ 9.99	$ 47.95	New York	$ 4.68	$ 8.30	$ 9.45
Florida	$ 18.41	$ 7.87	$ 14.44	Ohio	$ 6.45	$ 5.47	$ 3.98
Georgia	$ 21.00	$ 6.17	$ 21.00	Oklahoma	$ 4.37	$ 2.19	$ 6.11
Iowa	$ 5.89	$ 2.28	$ 6.16	Oregon	$ 25.45	$ 2.28	$ 23.94
Idaho	$ 17.17	$ 6.60	$ 14.53	Pennsylvania	$ 31.93	$ 37.53	$ 7.94
Illinois	$ 9.09	$ 2.63	$ 7.13	Rhode Island	$ 14.70	$ -	$ 14.70
Indiana	$ 19.23	$ 3.35	$ 16.98	South Carolina	$ 14.12	$ 7.97	$ 17.25
Kansas	$ 17.21	$ 1.45	$ 16.28	South Dakota	$ 46.55	$ 0.27	$ 46.64
Kentucky	$ 15.50	$ 9.42	$ 6.51	Tennessee	$ 19.82	$ 3.36	$ 19.95
Louisiana	$ 24.65	$ 4.88	$ 19.92	Texas	$ 26.83	$ 5.44	$ 26.02
Massachusetts	$ 29.61	$ 11.05	$ 22.98	Utah	$ 18.09	$ 3.50	$ 15.03
Maryland	$ 20.00	$ 8.75	$ 15.97	Virginia	$ 27.11	$ 9.42	$ 22.02
Maine	$ 44.85	$ 22.71	$ 24.36	Vermont	$ 48.23	$ 13.12	$ 37.04
Michigan	$ 14.53	$ 4.14	$ 10.60	Washington	$ 18.05	$ 3.74	$ 17.23
Minnesota	$ 5.81	$ 4.07	$ 5.61	Wisconsin	$ 21.39	$ 9.63	$ 19.13
Missouri	$ 24.70	$ 8.66	$ 18.15	West Virginia	$ 20.47	$ 12.06	$ 18.84
Mississippi	$ 36.11	$ 1.55	$ 35.88	Wyoming	$ 25.69	$ 1.28	$ 25.14

As a result, the model was run excluding Alaska, New Hampshire, Delaware, Vermont, South Dakota and North Dakota obtaining a new dataset with the states with less variance. In this way we avoid that the high variance of one case generate the global coefficient (see table A.2.)

Table A.2.

Linear regression

Number of obs	= 180
F(9, 170)	= 46.11
Prob > F	= 0.0000
R-squared	= 0.7981
Root MSE	= 6.9215

total_inv~le	Coef.	Robust Std. Err.	t	P>|t|	[95% Conf.	Interval]
cable_taxes	-.3374049	.1668042	-2.02	0.045	-.6666792	-.0081306
cable_t_1_pc	.5109202	.0517627	9.87	0.000	.4087398	.6131005
median_inc~e	-.1195129	.1284942	-0.93	0.354	-.3731626	.1341369
population_	.2233769	.0984278	2.27	0.024	.0290788	.4176749
educ_h_sch	.1838405	.1905334	0.96	0.336	-.1922757	.5599567
hh_rural_2~e	-.0711308	.0448313	-1.59	0.114	-.1596287	.017367
age_5_19	-.7997906	.6859175	-1.17	0.245	-2.153803	.5542221
age_more_60	-.4915323	.9382715	-0.52	0.601	-2.343696	1.360631
age_20_34	-.811144	1.368459	-0.59	0.554	-3.512505	1.890218
_cons	38.20574	53.54932	0.71	0.477	-67.50152	143.913

Linear regression

Number of obs	= 180
F(9, 170)	= 37.46
Prob > F	= 0.0000
R-squared	= 0.7966
Root MSE	= 14.075

total_inv~re	Coef.	Robust Std. Err.	t	P>|t|	[95% Conf.	Interval]
wire_taxes	-.6509676	.3340252	-1.95	0.053	-1.310339	.0084038
wire_t_1_pc	.4490882	.0428186	10.49	0.000	.3645635	.533613
median_inc~e	.5286253	.2693314	1.96	0.051	-.0030393	1.06029
population_	-.1816227	.1538827	-1.18	0.240	-.4853896	.1221443
educ_h_sch	-.8058593	.5065026	-1.59	0.113	-1.805704	.1939852
hh_rural_2~e	-.1025419	.1311707	-0.78	0.435	-.3614751	.1563912
age_5_19	-4.651184	2.313644	-2.01	0.046	-9.218356	-.0840115
age_more_60	-2.732717	1.571586	-1.74	0.084	-5.835055	.3696206
age_20_34	1.576516	3.187837	0.49	0.622	-4.716328	7.86936
_cons	182.8136	91.33992	2.00	0.047	2.507103	363.1201

Variable	Obs	Mean	Std. Dev.	Min	Max
total_inv~le	45	26.50568	18.18824	0	75.4506
total_inv~re	45	100.0848	42.6766	23.82223	262.4692
cable_taxes	45	4.688	3.653308	0	9.25
wire_taxes	45	4.158667	3.751817	0	9.25

The model results indicate that:

- Cable taxes and taxes for Wireless & Wireline investment have the same sign and significance of the original model (in page 16)
- According to these new estimations, if the sales tax on cable investment is reduced by 1 percentage point (from 4.69% to 3.69%), the investment per capita increases from $26.51 to $26.85 (an increase of 1.27%)
- Furthermore, if the sales taxes on cable investment are completely eliminated, the investment per capita increases to $28.09 (an increase of 5.97%)
- Also, according to these estimations, if taxes on wireless and wireline investment are reduced by 1 percentage point (from 4.16% to 3.16%), the investment per capita increases from $100.08 to $100.73 (an increase of 0.65%)
- Similarly, if those taxes are completely eliminated, the investment per capita increases to $102.79 (an increase of 2.70%)

Second test: rather than running the econometric models assuming all states have equal importance, the sample was weighted by population size

Table A.3.

```
Linear regression                                      Number of obs =    4000
                                                       F(  9,  3990) =  813.42
                                                       Prob > F      =  0.0000
                                                       R-squared     =  0.7521
                                                       Root MSE      =  7.5726
```

total_inv~le	Coef.	Robust Std. Err.	t	P>|t|	[95% Conf.	Interval]
cable_taxes	-.3750281	.0457257	-8.20	0.000	-.464676	-.2853803
cable_t_1_pc	.5134775	.0119803	42.86	0.000	.4899893	.5369656
median_inc~e	-.2550234	.0300045	-8.50	0.000	-.3138488	-.1961979
population_	.1331315	.0177714	7.49	0.000	.0982897	.1679734
educ_h_sch	.2873938	.0502832	5.72	0.000	.1888105	.385977
hh_rural_2~e	-.1118353	.0140653	-7.95	0.000	-.1394112	-.0842595
age_5_19	-1.854726	.226486	-8.19	0.000	-2.298765	-1.410686
age_more_60	-1.1662	.1987387	-5.87	0.000	-1.555839	-.7765615
age_20_34	-1.476708	.5045926	-2.93	0.003	-2.465991	-.4874241
_cons	86.32567	14.18763	6.08	0.000	58.50998	114.1414

```
Linear regression                                      Number of obs =    4000
                                                       F(  9,  3990) =  838.91
                                                       Prob > F      =  0.0000
                                                       R-squared     =  0.6851
                                                       Root MSE      =  15.424
```

total_inv~re	Coef.	Robust Std. Err.	t	P>|t|	[95% Conf.	Interval]
wire_taxes	-.4212852	.0564273	-7.47	0.000	-.5319142	-.3106561
wire_t_1_pc	.4410253	.0084406	52.25	0.000	.4244771	.4575736
median_inc~e	.4443053	.0687284	6.46	0.000	.3095593	.5790513
population_	-.3676691	.0357007	-10.30	0.000	-.4376624	-.2976758
educ_h_sch	-.7158625	.1470854	-4.87	0.000	-1.004232	-.427493
hh_rural_2~e	-.1915273	.0502288	-3.81	0.000	-.2900038	-.0930509
age_5_19	-.7836643	.63273	-1.24	0.216	-2.024169	.4568399
age_more_60	-2.547724	.4608254	-5.53	0.000	-3.451199	-1.644249
age_20_34	-4.298252	1.217296	-3.53	0.000	-6.684833	-1.911672
_cons	216.8576	23.63269	9.18	0.000	170.5243	263.1908

Variable	Obs	Mean	Std. Dev.	Min	Max
total_inv~le	1000	33.58784	17.31571	0	75.4506
total_inv~re	1000	103.7868	44.90687	23.82223	677.9399
cable_taxes	1000	5.41567	3.799544	0	9.25
wire_taxes	1000	4.74935	3.938028	0	9.25

The model results indicate that:

- In the original models, each state had equal importance
- In this test, each state observation was weighted by its population
- Under this test, the model results are robust and the signs of the impact coefficients do not change.
- A higher mean of the tax level on the investment (for both cable and wireless & wireline) results from higher taxes on the states with more population
- The model's main results indicate that:

If taxes on cable investment were reduced 1% (from 5.42% to 4.42%), investment per capita would growth from $33.58 to $33.96 (1.12%)

If taxes on cable investment were completely eliminated, investment per capita would growth $35.62 (6.05%)

If taxes on telecommunications investment were reduced 1% (from 4.75% to 3.75%) investment per capita would growth from $103.79 to $104.21 (0.41%)

If taxes on telecommunications investment were eliminated investment per capita would growth to $105.79 (1.93%)

Third test: an alternative test consists in including a year's dummy variable to identify if investment is affected by variables not captured in state fixed effects (e.g. recession)

Table A.4.

Linear regression						
				Number of obs =		200
				F(12, 187) =		43.38
				Prob > F =		0.0000
				R-squared =		0.8165
				Root MSE =		6.5581

total_inv~le	Coef.	Robust Std. Err.	t	P>|t|	[95% Conf.	Interval]
cable_taxes	-.2896171	.1526131	-1.90	0.059	-.5906817	.0114475
cable_t_1_pc	.5098589	.0500225	10.19	0.000	.411178	.6085397
median_inc~e	-.1656499	.1136763	-1.46	0.147	-.3899026	.0586028
population_	.243577	.0968808	2.51	0.013	.0524572	.4346967
educ_h_sch	.2337737	.1814588	1.29	0.199	-.1241957	.591743
hh_rural_2~e	-.0903122	.04302	-2.10	0.037	-.1751791	-.0054453
age_5_19	-.8448069	.5859924	-1.44	0.151	-2.000812	.3111985
age_more_60	-.3263121	.7443772	-0.44	0.662	-1.794768	1.142144
age_20_34	-.5002356	1.214366	-0.41	0.681	-2.895853	1.895382
y2008	-5.129256	1.589034	-3.23	0.001	-8.263993	-1.99452
y2009	-4.5534	1.435544	-3.17	0.002	-7.385341	-1.721458
y2010	-3.682704	1.545955	-2.38	0.018	-6.732458	-.6329509
_cons	31.33391	45.10937	0.69	0.488	-57.65475	120.3226

Linear regression						
				Number of obs =		200
				F(12, 187) =		27.87
				Prob > F =		0.0000
				R-squared =		0.5121
				Root MSE =		29.409

total_inv~re	Coef.	Robust Std. Err.	t	P>|t|	[95% Conf.	Interval]
wire_taxes	-.7736792	.4843964	-1.60	0.112	-1.729263	.1819045
wire_t_1_pc	.4794689	.0434966	11.02	0.000	.3936618	.565276
median_inc~e	.4722804	.3374315	1.40	0.163	-.1933812	1.137942
population_	-.3234183	.2484115	-1.30	0.195	-.8134674	.1666307
educ_h_sch	-.393892	.5609912	-0.70	0.483	-1.500577	.7127928
hh_rural_2~e	-.0188774	.151553	-0.12	0.901	-.3178507	.2800959
age_5_19	-6.023232	3.351287	-1.80	0.074	-12.63442	.5879557
age_more_60	-8.263305	6.037172	-1.37	0.173	-20.17302	3.646412
age_20_34	-3.948839	6.691133	-0.59	0.556	-17.14864	9.250966
y2008	1.133954	2.892687	0.39	0.695	-4.572539	6.840447
y2009	-.8824378	2.9452	-0.30	0.765	-6.692526	4.92765
y2010	16.95044	7.881336	2.15	0.033	1.402686	32.4982
_cons	385.8544	274.4074	1.41	0.161	-155.4776	927.1864

The model results indicate:

- Under this model, the coefficients of the taxes variables (and its statistical significance) are very similar to the one in the original model (a difference smaller than the 10%)
- In addition, according to these specifications, the cable investment was higher for 2007 than in the original model, but returned to a similar pattern for 2008, 2009 and 2010

- For Wireless & Wireline, 2009 was the year with less investment per capita, mainly because the economic crisis; however, the inertia of capital planning of telecom investment explained that the investment of 2009 did not differ significantly from the rest of the time series
- As a result, this test allows determining that the economic crisis did not affect the investment levels significantly; these were mainly driven by the level of investment of the previous year (inertia effect) and the sales tax level.