ASSESSMENT OF THE ECONOMIC IMPACT OF THE REPEAL OF THE TAX EXEMPTION ON TELECOMMUNICATION INVESTMENT IN MINNESOTA

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EXECUTIVE SUMMARY

The telecommunications industry has made substantial investments in Minnesota in recent years. Between 2006 and 2012, total investment amounted to $ 5.167 billion (or $ 835.65 per capita)[1]. In the last four years alone (2010-2013 period), telecommunications companies invested $ 2.994 billion. Of this sum, 56.3 % were directly dedicated to the deployment of broadband services, while approximately 50% were invested in suburban, rural and isolated communities[2].

This investment has contributed to the support of 112,239 jobs/year and the generation of US$ 10.386 billion in output. In the context of an initially recovering state economy, which continues to exhibit a significant duality between urban and rural settings, any policy initiative that has a potential to reduce the rate of telecommunications investment could have detrimental effects on this investment rate and its impact. Along these lines, this paper examines the effects of repealing the sales tax exemption on telecommunications equipment purchasing, as enacted in 2013[3].

Based on an econometric analysis of United States data, each percentage point increase in the sales tax rate on telecommunications equipment (for example, from 3.00% to 4.00%) decreases cable TV investment by $0.46 per capita and telecommunications investment by $0.93 per capita across all states. Minnesota's effective tax rate for telecommunications equipment in 2014 would jump from zero to 7.66%[4]. As such, the econometric analysis shows that the repeal of the sales tax exemption would trigger a decrease in cable TV investment of $ 3.51 per capita (equivalent to 11.77% under the current level[5] of $29.82) and a decrease in telecommunications investment of $7.15 per capita (6.57% less than the current level of $108.72). In total, the decrease in investment would amount to $57 million (or a 8.53% decrease of a planned 2013 investment base of $668.61 million) the first year of impact and $96 million in the second year due to the inertia effect that characterizes telecommunications equipment spending. As a result, the imposition of sales taxes produces not only a short-term but also a long-term effect on investment levels. Based on this decrease, it is estimated that over four years, total revenues to be generated to the state treasury would reach approximately $113.37 million[6].

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[1] This sum comprises the investment of the following companies: Verizon Wireless, Sprint, T-Mobile, ATT, Verizon Wireline, Century Link, Charter, Comcast, Mediacom, Midcontinent, Sjoberg's, Wikstrom Telephone Company, Halstad Telephone Company, Emily Cooperative Telephone Company, Spring Grove Communications, and other twenty independent telephone companies operating in the state.

[2] 11.6% of the investment was fulfilled by carriers serving only rural and isolated communities, 3.3% was invested in carriers serving suburban and rural communities, and 74% was invested by carriers serving the whole state (only 11.1% was invested by carriers serving urban and suburban communities).

[3] See full text in appendix A.

[4] An average of 7.66% for the four largest cities.

[5] For the analysis using the latest information available, corresponding to the amount of investment in 2010.

[6] The Minnesota Department of Revenue projects revenue from the repeal to reach $ 148.8 million.

More importantly, given the short term multiplying impact that results from network deployment, a $153 million reduction in spending for these initial two years would trigger a decrease of 3,323 jobs and $308 million in GDP. Beyond this direct effect, econometric modeling indicates that eliminating the sales and use tax exemption on telecommunications infrastructure would – in just two years – reduce economic activity by $722 million.

To provide additional evidence of the negative effects of the repeal of the sales tax exemption, a survey conducted across telecommunications companies operating in the state (which generated 39 responses) indicated that, under the current tax policy, at least 40 % of service providers would reduce their investment in 2014. Alternatively, at least 50 % of service providers would either marginally or substantially increase their CAPEX if the exemption were to be extended and/or expanded.

In sum, the repeal of the sales and use tax exemption on "telecommunications" capital equipment is detrimental to the economy of Minnesota. Consistent with the recommendations of the Governor's Task Force, the repeal should be reconsidered (and the exemption should be potentially extended to other investment categories) to allow telecommunications service providers to continue playing a critical role in the economic growth in the state.

1. INTRODUCTION

Since 2001, the State of Minnesota has enacted a sales and use tax exemption for certain "telecommunications" capital equipment. According to the original sales tax exemption statute (Minn. Stat. 297A.68, Subd. 35), the exemption applied to the purchase of electronic equipment housed in central offices, head ends, or hung on towers. The industry and policy makers widely accept that the former exemption included within its scope equipment used to provide telecommunications and/or broadband services.

In 2013, the Minnesota Legislature repealed the sales tax exemption. The decision was made despite a recommendation from Minnesota Governor Mark Dayton's own State Broadband Task Force to expand – rather than repeal – the exemption to include additional types of capital equipment used to provide broadband services. In fact, a key part of the Task Force's recommendation was to expand the exemption to include the purchase of other broadband equipment[7].

As a result of this decision, the state will, as expected, increase direct tax collection from telecommunications companies. According to the Minnesota Legislature Tax Conference Committee report by the Senate Fiscal staff, the repeal of the sales tax exemption on telecommunications capital equipment is estimated to bring in $148.8 million in sales tax revenue between 2014 and 2017.[8] However, this number needs to be considered in relation to the potential negative social and economic impact the measure could have. In short, while a tax exemption repeal will increase state treasury revenues, it could simultaneously discourage investment in telecommunications, subsequently having a detrimental impact on the deployment and adoption of telecommunications services, particularly broadband.

The purpose of this document is to assess the social and economic impact of the repeal of the sales tax exemption on telecommunications capital equipment. It is based on econometric analyses and relies on telecommunications service providers' investment information in the state of Minnesota between 2006 and 2013.

The study's underlying logic is that the deployment of telecommunications infrastructure requires the investment in equipment and outside plant, from fiber optics to electronics. That said, telecommunications service providers would be subject to sales tax on the purchase of equipment, which is defined by state and local laws. These levies increase the cost of deploying infrastructure and potentially reduce the amount of capital

[7] The task force made the following proposal: "Extend current sales tax exemption on equipment purchased for use in a central office to include the purchase of fiber optics and broadband equipment. Example: Currently, machinery and equipment used directly by a telecommunications, cable television or direct satellite service providers is exempt from sales and use tax in Minnesota. This proposal would expand the exemption to include fiber equipment necessary to deploy higher bandwidth speeds that meet the state broadband goals"

[8] 013 Session - - Omnibus Tax Bill Summary Comparison for Chapter 143: Governor March 2013, House: HF 677- 3E and Senate: HF 677 - 1UE p. 5

available for the deployment of telecommunications networks, particularly broadband infrastructure. Since telecommunications have been proven to contribute to economic growth and job creation, lesser investment - caused by sales taxes on investment - has the potential to reduce their economic impact. In this context, this study will provide quantitative evidence of the negative economic impact of the repeal of the sales tax exemption on companies investing in telecommunications infrastructure in Minnesota.

The analysis is based on three different methodologies:

1. The compilation of historical (2006-2012) data on Minnesota telecommunications investment by cable, wireless, and wireline companies allows for an estimation of the past contribution of telecommunications service providers to the state GDP, as well as to the creation of employment;

2. Based on an econometric model developed with national datasets, the economic impact of the sales tax repeal on investment in Minnesota was estimated. By relying on those estimates, the study projects the potential impact that an elimination of the sales tax exemption will have on the state economy and its ability to generate employment;

3. A survey of operators' plans with regard to future telecommunications investment level in reaction to the repeal of the sales tax exemption has been conducted to measure the potential impact of the measure.

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 the amount of capital investment of telecommunications companies in Minnesota between 2006 and 2012. On this basis, it estimates the historical economic impact (GDP growth, jobs) resulting from this investment. The analysis underlines the short-term effects of network deployment as well as the long-term impact of positive externalities and spillover effects on industries beyond telecommunications service providers.

Chapter 4 offers the core of the argument of the negative impact of repealing the telecommunications equipment tax exemption. It presents three pieces of evidence. First, based on the results of an econometric model developed based on national data, it presents the impact that sales taxes have on network equipment purchases in the state of Minnesota. By relying on these estimates, the study projects the potential impact of an

elimination of the sales tax exemption on network equipment purchases. Having proven the inverse causality between sales taxes on equipment purchasing and investment, the social and economic negative impact that a repeal of the tax exemption might have is estimated. Second, the chapter concludes by providing the results of a survey conducted among telecommunications companies in the state providing a perspective on how taxation will affect their telecommunications network investment levels. The conclusion, presented in Chapter 5, summarizes the results of all the evidence to conclude on the potential economic implications that the repeal of the sales tax exemption on telecommunications equipment might have for Minnesota.

2. ECONOMIC IMPACT OF TAXATION ON TELECOMMUNICATIONS INVESTMENT IN THE UNITED STATES: A REVIEW OF THE LITERATURE

The research literature concurs 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 a company's incentives 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, which have a greater need for investment.

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 alone 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 primarily affects 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 worth while."

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

It should be noted that changes in tax regimes do not instantaneously affect investment decisions. 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 purchasing of equipment) might affect the incentives to invest immediately, but only translate into investment decisions gradually (Auerbach, 2005).

This condition is even more acute in capital-intensive industries such as telecommunications. Typical capital planning processes in telecommunications comprise decisions in three domains: maintenance of existing plants (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). Different time constraints drive each investment domain. 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 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 targeted 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, an examination of the impact of taxation on telecommunications network investment should consider several premises. When constructing econometric models that explain the evolution of telecommunications 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 is important to consider variables that measure 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 that reflect the nature of the business opportunity. Finally, while the models developed to explain telecommunications 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 influenced by specific conditions of taxation regimes. In that sense, methodologies must accommodate the inertia of budgetary processes, whereby the level of investment in prior years can, to some degree, determine future capital investments.

Along these lines, Katz, Flores, and Callorda (2012) built an econometric model to quantify the impact of sales taxes on telecommunications and cable TV investment in the United States. Considering that the telecommunications and cable TV industries might 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. The following table presents model results for the telecom and cable TV industries.

Table 1. Model of Impact of Sales Tax Rate on Telecommunications Investment per capita[9]

Independent Variables	Cable Investment	Wireless & Wireline Investment
Sales Tax Rate	-0.458 (**) (0.236)	-0.933 (*) (0.666)
GDP Per Capita (Thousands of 2010 Dollars)	0.0001 (0.040)	0.7598 (**) (0.398)
Population	0.330 (**) (0.150)	-0.388 (0.411)
Human Capital	5.29 (21.54)	-113.86 (110.71)
Rural Population	-7.217 (5.349)	-8.637 (18.566)
Investment the last year	0.762 (***) (0.075)	0.644 (***) (0.065)
% population with 60 years or more	99.297 (80.96)	-1,109.86 (883.66)
% population between 23/32 years	60.60 (162.90)	-1,798.65 (1,515.84)
Constant	-24.05 (45.31)	604.44 (484.55)
Adjusted R^2	79.67%	49.35%
Observations	200	200

(***) Significant at 1%; (**) Significant at 10%; (*) Significant at 20%
Source: TAS analysis

The coefficient for the sales tax rate variable indicates that a 1 percentage point decrease in the sales tax rate (for example, from 4.00% to 3.00%) would increase cable TV investment by $0.46 per capita and wireline and wireless investment by $0.93 per capita across all states. These results are statistically significant at the 10% level for cable TV investment and 20% for wireless and wireline[10]. The report will later use the results of this econometric model to estimate the impact on investment levels resulting from the elimination of the repeal of Minnesota's sales tax on communications equipment.

3. THE ECONOMIC CONTRIBUTION OF TELECOMMUNICATIONS NETWORK INVESTMENT IN MINNESOTA BETWEEN 2006 AND 2012

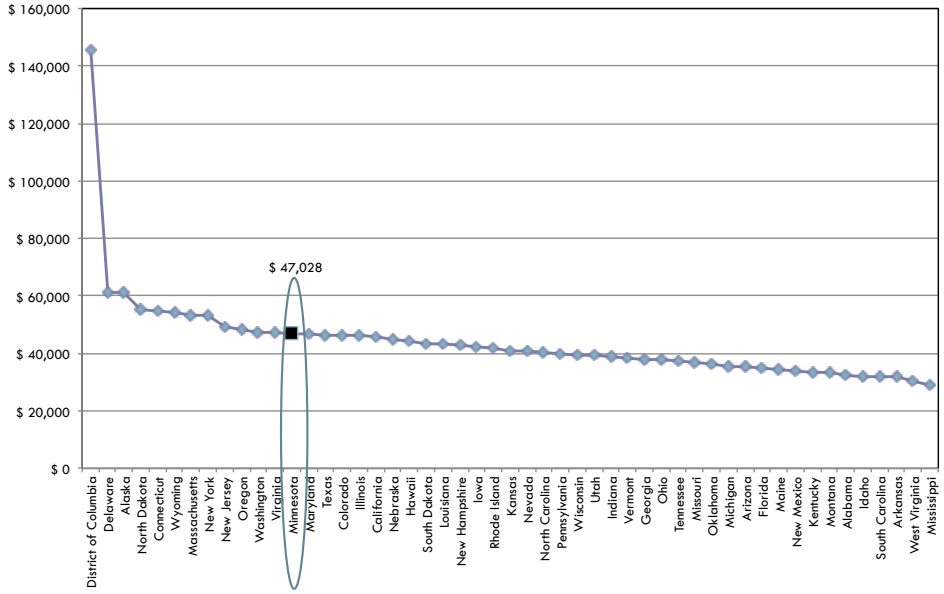
Having reviewed the research literature, which finds that a reduction of sales taxes on telecommunications network equipment purchases has a substantial impact on investment levels, we estimate the historical economic impact of telecommunications investment in the state of Minnesota. This analysis provides the background and context against which a repeal of the tax exemption will be assessed. This chapter begins by reviewing the key features of the state economy. It then provides telecommunications investment statistics from 2006 through 2012. These statistics are then used to estimate the historical impact of telecommunications investment.

[9] The model utilized in the cited research included Median Income (in 2010 dollars) as control variable rather than GDP, yielding a slightly higher significance for wireless and wireline investment, but lower in cable TV investment (see appendix D).
[10] The lower level of statistical significance in the wireless and wireline model is explained by the reduced number of observations, but the robustness of results in the model was supported by numerous case studies.

3.1. The Minnesota Economy

Minnesota ranks 13th in the United States in terms of GDP per capita (see Figure 1).

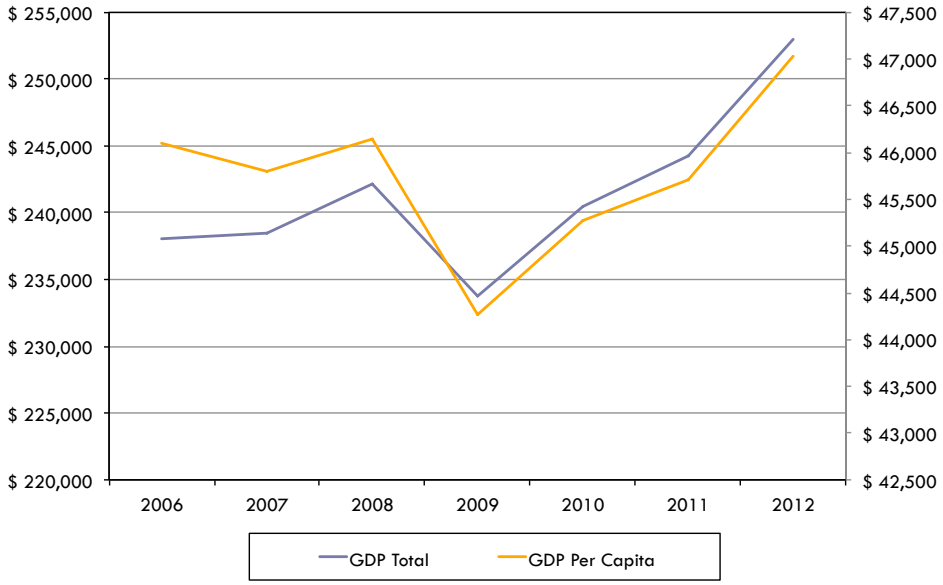
Figure 1. United States: States' Ranking by GDP per Capita (2012), 2005 dollars



Note: The values are in chained 2005 dollars
Source: US Bureau of Economic Analysis; TAS analysis

Between 2006 and 2012, Minnesota GDP per capita grew by 2.02%, while total GDP increased by 6.28% (the difference is explained by an increase in total population).

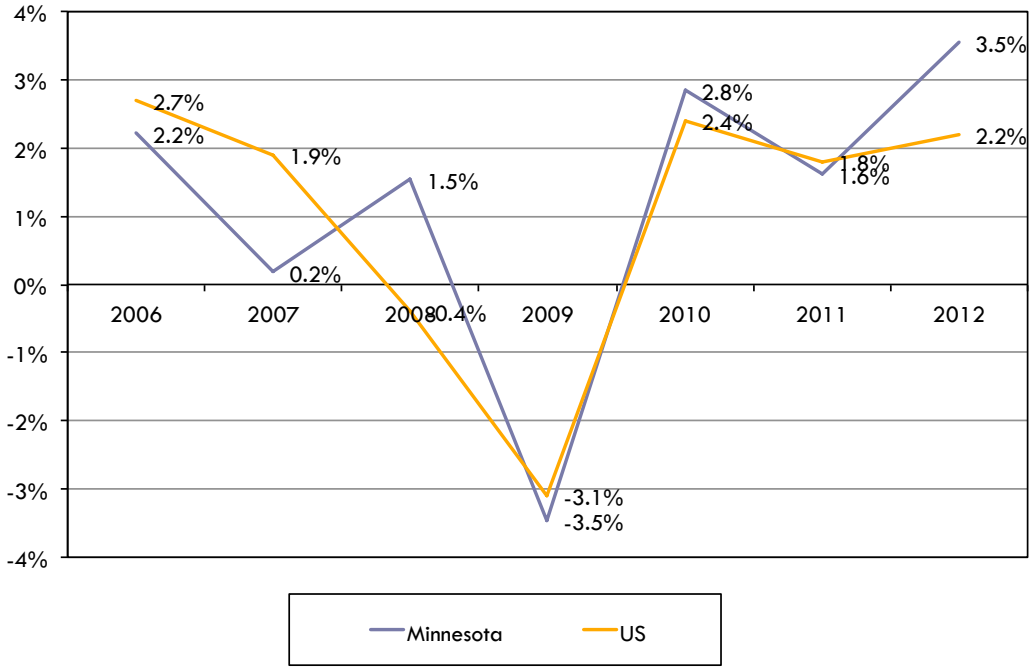
Figure 2. Minnesota GDP (2006-2012)



Note: GDP Total is in millions of constant 2005 dollars, GDP per Capita is reported in 2005 dollars
Source: US Bureau of Economic Analysis; TAS analysis

In relative terms, the Minnesota economy grew in tandem with the national average until 2012, when its growth rate exceeded that of the United States by 1.3 percentage points (see figure 3).

Figure 3. United States versus Minnesota: Comparative Economic Growth (2006-2012)



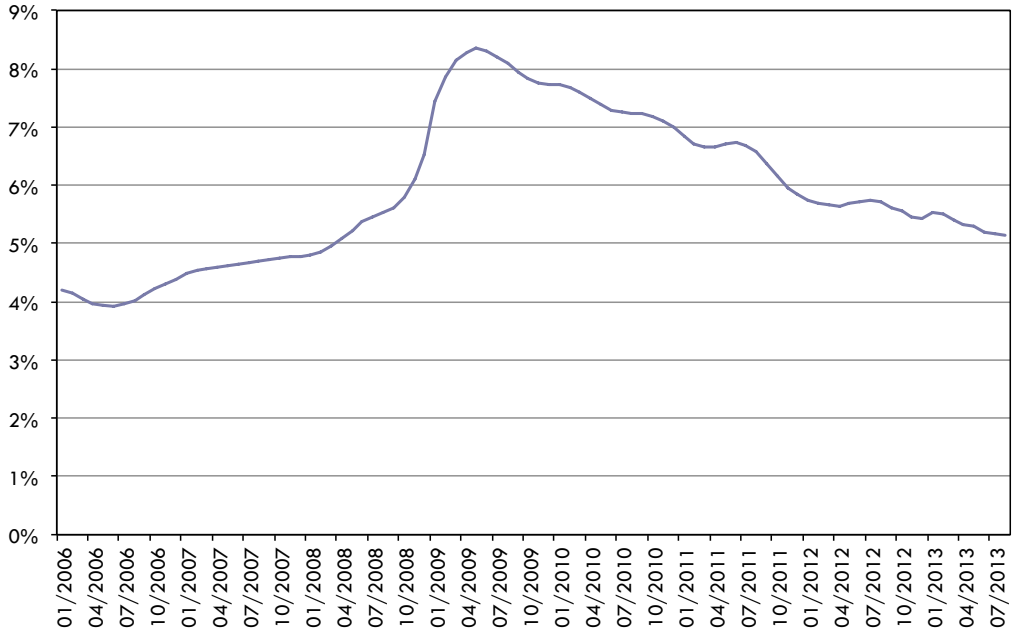
Source: US Bureau of Economic Analysis; TAS analysis

According to these statistics, Minnesota's economy appears to be on a clear recovery. In this context, it is critical to consider public policies that could potentially further stimulate both economic growth and job creation, particularly in light of the persistent duality between urban and rural economies. For example, according to the latest information available, while the average per capita income (in nominal terms) for Minnesotans was $44,559, rural per capita income lagged at $37,527.[11]

On the other hand, as of August 2013, Minnesota´s unemployment rate was 5.13%, which implies that 152,473 individuals of a total labor force of 2,970,779 were unemployed. The unemployment rate increased through 2009, but has declined since then confirming the state economic recovery (figure 4):

[11] US Department of Agriculture-Economic Research Service, 2011

Figure 4. Minnesota Unemployment Rate (2006-2013)



Source: US Census Bureau; TAS analysis

However, replicating the income disparity mentioned above, rural Minnesota has an unemployment rate of 6.7% while the urban part of the state has a 6.3% unemployment rate (USDA-ERS, 2011).

In sum, while an assessment of last year's trend indicates a clear economic rebound in aggregate terms, policy makers should not rush to implement policies that might either stall the growth vector or limit the ability to redress some of the rural and urban disparities that still affect the state.

3.2. Telecommunications investment in Minnesota

The telecommunications industries in Minnesota invested a total of $5,167 million between 2006 and 2012 (see table 2).

Table 2. Minnesota: Total Telecommunications Investment (2006-2012)
(in $ millions)

	2006	2007	2008	2009	2010	2011	2012	Total
Telecommunications	514.13	504.88	528.69	542.64	614.15	624.58	576.62	3,905.69
Cable TV	190.28	225.22	165.04	170.19	176.62	175.78	158.18	1,261.32
Total	704.42	730.10	693.73	712.84	790.77	800.36	734.80	5,167.01

Source: Broadband Tax Institute; Minnesota Cable Communications Association; Minnesota Telecom Alliance; TAS analysis

This amount represents 0.31% of accumulated GDP for the same period. As a result, telecommunications equipment investment per capita in the state has increased at an annual rate of 0.71% in the last seven years (See table 3).

Table 3. Minnesota: Total Telecommunications Investment per capita (2006-2012)

	2006	2007	2008	2009	2010	2011	2012	CAGR
Telecommunications	$ 96.93	$ 95.19	$ 99.68	$ 102.31	$ 115.79	$117.76	$108.72	1.93%
Cable TV	$ 35.88	$ 42.46	$ 31.12	$32.09	$ 33.30	$33.14	$29.82	-3.03%
Total	$ 132.81	$ 137.65	$ 130.80	$ 134.40	$ 149.09	$150.90	$138.54	0.71%

Source: Broadband Tax Institute; Minnesota Cable Communications Association; Minnesota Telecom Alliance; TAS analysis

However, when compared to the national average, Minnesota still lags behind the United States by between $35.27 per capita (in 2006) and $13.22 per capita (in 2010), with a lag reduced over time on a per capita basis (table 4) and as percent of GDP (table 5).

Table 4. Total Telecommunications Investment per capita (2006-2010)

	2006	2007	2008	2009	2010	CAGR
United States	$ 168.08	$161.15	$149.17	$137.34	$162.31	-0.87%
Minnesota	$ 132.81	$ 137.65	$ 130.80	$ 134.40	$ 149.09	2.93%

Note: The original US numbers represent the sum of the four major telecommunications carriers (ATT, Verizon, Sprint, and Qwest) as well as almost all cable TV operators (approximately 80% of all spending). For this reason they were increased by 20%, so that they are comparable with those of Minnesota
Source: Broadband Tax Institute; Minnesota Cable Communications Association; Minnesota telecom Alliance; TAS analysis

Table 5. Total Telecommunications Investment as a percent of GDP (2006-2010)

	2006	2007	2008	2009	2010	CAGR
United States	0.38%	0.35%	0.32%	0.30%	0.35%	-1.95%
Minnesota	0.30%	0.31%	0.29%	0.30%	0.33%	2.68%

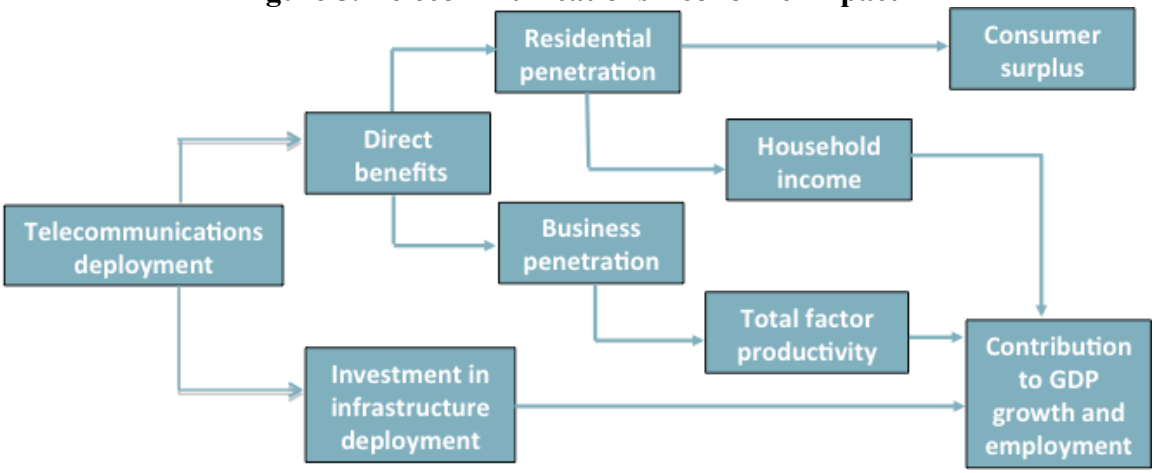
Note: The original US numbers represent the sum of the four major telecommunications carriers (ATT, Verizon, Sprint, and Qwest) as well as almost all cable TV operators (approximately 80% of all spending). For this reason they were increased by 20%, so that they are comparable with those of Minnesota
Source: Broadband Tax Institute; Minnesota Cable Communications Association; TAS analysis

The investment in telecommunications has had a significant impact on the state's economy, both in terms of fostering GDP growth and creating employment. The following section provides an estimate of both effects.

3.3. Economic Impact of Telecommunications Investment in Minnesota

Telecommunications investment has multiple economic effects, ranging from the growth of output, to the creation of jobs, to the increase in consumer surplus (see figure 5).

Figure 5. Telecommunications Economic Impact



Source: TAS analysis

The first effect results from the construction of telecommunications networks. In a way similar to any infrastructure project, the deployment of networks creates jobs and impacts the economy by means of multipliers. The second effect results from the "spill-over" externalities, which impact both enterprises and consumers. The adoption of telecommunications within firms leads to a multifactor productivity gain, which in turn contributes to GDP growth. 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 telecommunications service and its actual price. This last parameter, while not captured in the GDP statistics, can be significant, insofar that it represents benefits in terms of enhanced access to information, entertainment and public services.

Furthermore, telecommunications also have a positive impact on job creation, as indicated by numerous studies, mainly focused on broadband (see table 6).

Table 6. Broadband impact on Job creation

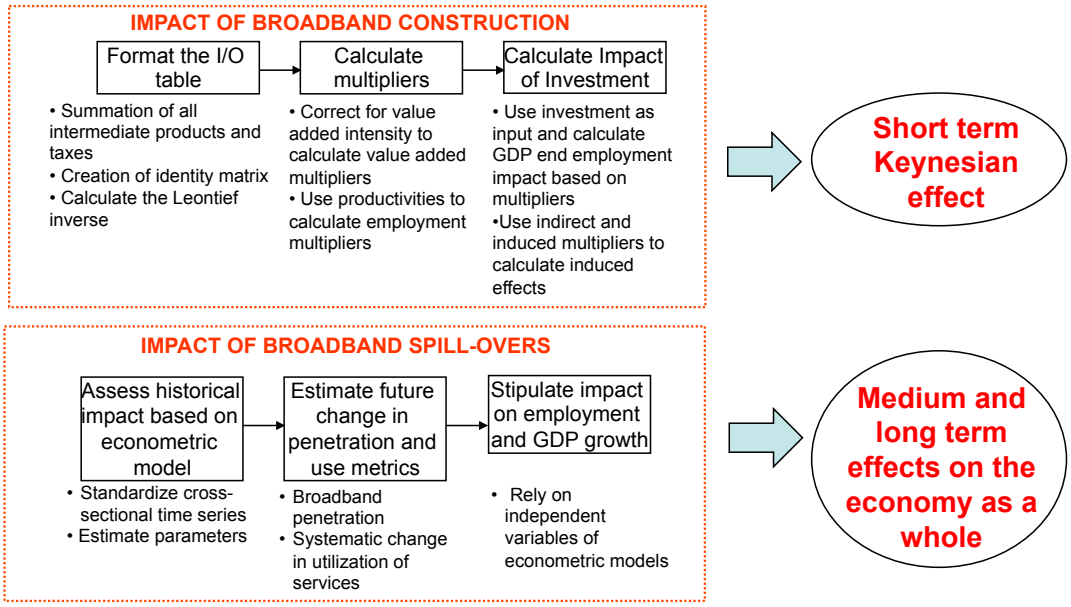
Study	Region/Country	Impact on job creation for each 1% increase in rate of growth of broadband penetration		Observations
		Employment	Unemployment	
Shideler *et al.* (2007)	Kentucky, USA	0.14-5.32		• Statistically significant level at 1% (total employment) • 114 observations (total).
Katz *et al.* (2010)	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 summarize, the review of the literature of telecommunications' economic impact concludes that telecommunications investment follows two paths. On the one hand, network construction leads to: 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 telecommunications networks are deployed, they yield enhanced positive externalities in terms of spillover effects on GDP and employment.

Along these lines, the economic effects of telecommunications 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 6).

Figure 6. Methodology for calculating the Economic Impact of Telecommunications Investment



Source: TAS analysis

The assessment of the direct impact of investment on telecommunications network construction in Minnesota was conducted by using an Input / Output analysis, which estimates the impact of additional investment throughout the economy as a result of multipliers. [12] According to this analysis, the $5.167 billion investment in telecommunications between 2006 and 2012 reviewed above has supported 112,239 jobs/year and generated US$ 10.386 billion in output (see table 7).

[12] See methodology in appendix B.

Table 7. Impact of Past Telecommunications Investment (2006-12)

Telecommunications Investment 2006 -2012 (US$ 5.167 billions)			
Value added (in $ billions except multipliers)	Direct effect	Value added generated in equipment manufacturing, construction and telecoms	$2.635
	Indirect effect	Value-added generated in other industrial sectors	$2.532
	Multiplier	Direct and indirect/Direct	1.96
Employment / years	Direct effect	Jobs in equipment manufacturing, construction and telecoms	30,309
	Indirect effect	Jobs in industries supplying to telecom and construction	29,686
	Induced	Jobs generated in household spending	52,244
	Total		112,239
Employment Multipliers	Type I Multiplier	(Direct + Indirect)/direct	1.98
	Type II Multiplier	(Direct + Indirect + induced)/direct	3.70
Total Industry Output (in $ billions, except multipliers)	Direct effect	Investment	$5.167
	Indirect effect	Additional goods generated	$5.219
	Multiplier	(Direct + Indirect) / Direct	2.01

Source: Bureau of Economic Research; TAS analysis

Minnesota investment by telecommunications companies between 2006 and 2012 reached $5.167 billion. This amount generated value added of $2.635 billion in the industries directly affected to network construction. In addition, the investment triggered additional value added in industries supplying inputs to equipment manufacturing, construction and telecommunications, such as electrical equipment, professional services, and metal products. The indirect effect amounts to $ 2.532 billion, which represents a multiplier effect of 1.96.

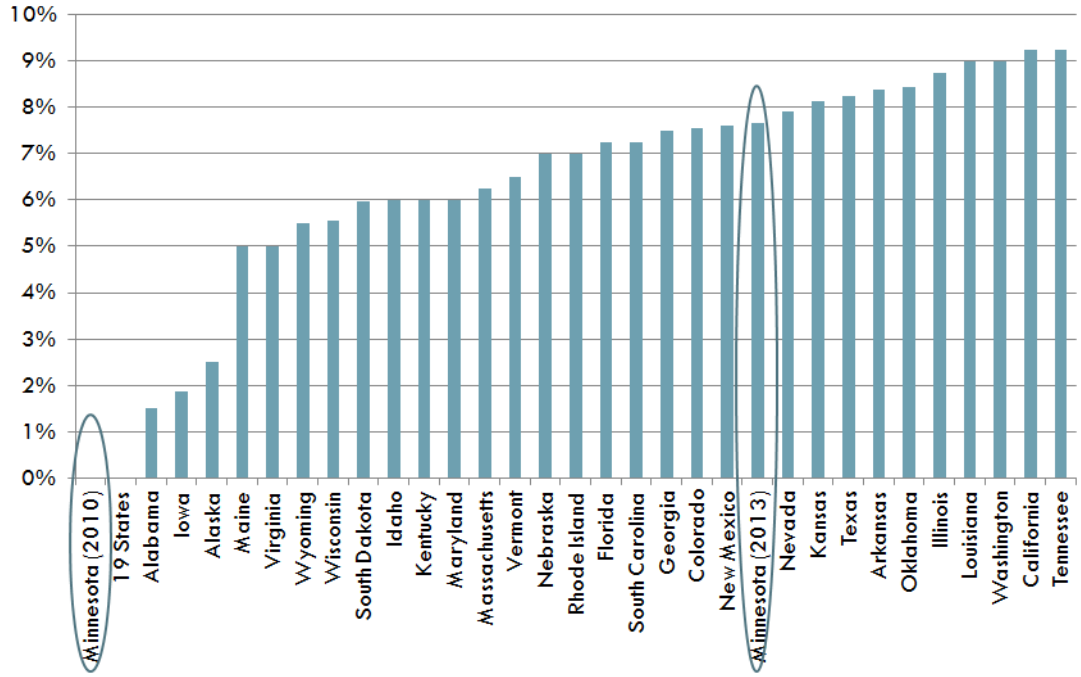
From an employment standpoint, telecommunications investment supported a total of 112,239 jobs/year. Among these, 30,309 were in the telecommunications services, construction, and telecommunications equipment industries and 29,686 were in the industries selling supplies to the directly affected sectors. Finally, the jobs created through direct and indirect effects yielded an increase in employment through induced effects, which account for jobs in sectors supplying general goods to households benefitting from direct and indirect effects.

To summarize, analysis of the effects of past telecommunications spending in the state shows how significant investment is to the state's economy. Therefore, it is pertinent to consider what is the potential impact of policy initiatives (such as the repeal of the tax exemption on telecommunications equipment purchasing) on investment and, by extension, on the economy as a whole.

4. IMPACT OF REPEAL OF TAX EXEMPTION ON TELECOMMUNICATIONS EQUIPMENT PURCHASING

In 2010, Minnesota was one of the twenty states in the nation where telecommunications network equipment was exempt from sales tax and one of 21 states with no sales tax applied to cable network investments. With the repeal of the tax exemption in 2013, Minnesota´s cable TV operators and telecommunications companies will be forced to pay a sales tax rate on initial equipment purchased. This rate begins at 6.875%, but local governments could impose an additional general sales tax up to 1%[13]). This implies that, when using the average effective sales tax rate in the four cities with the largest populations, Minnesota enacted the 11th highest tax rate for telecommunications and the 12th highest for cable investment in the nation (see Figures 8 and 9).

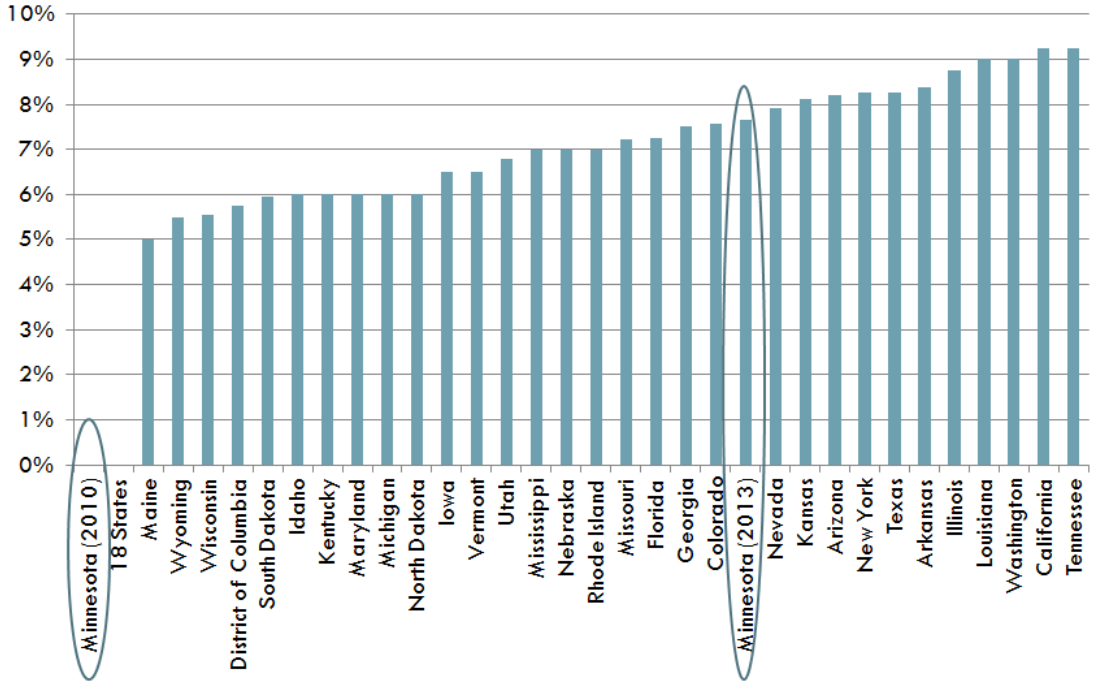
Figure 8. Ranking of Sales Tax Rate on Investment in Wireless & Wireline network equipment before and after the repeal of the tax exemption



Source: Broadband Tax Institute; TAS analysis

[13] With the additional taxes, the total general sales tax rate is 7.875% in Duluth, 7.775% in Minneapolis, 7.625% in St. Paul, and 7.375% in Rochester. This results in an average rate of 7.66% for the four largest cities.

Figure 9. Ranking of Sales Tax Rate on Investment in Cable network equipment before and after the repeal of the tax exemption



Source: Broadband Tax Institute; TAS analysis

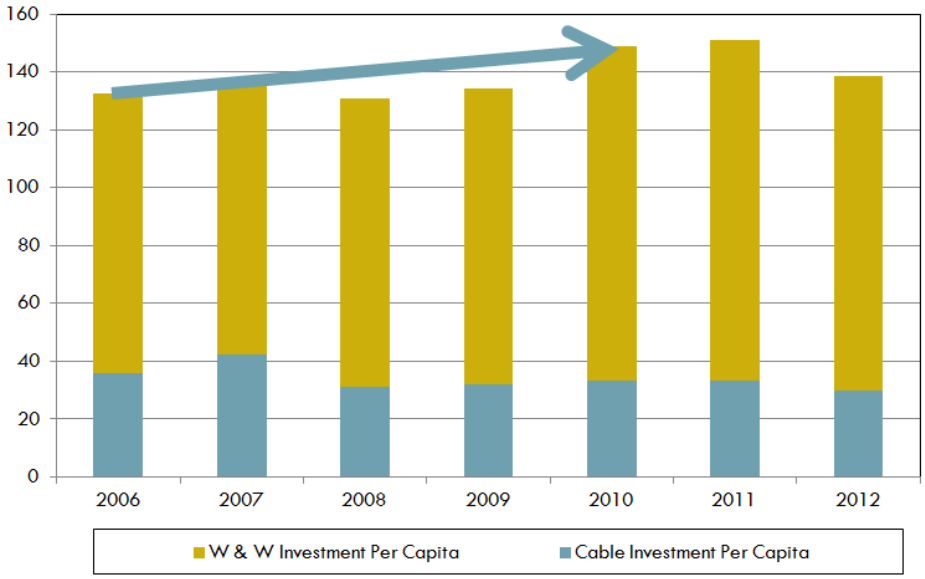
The following section presents the evidence pointing to the negative potential economic effect of the repeal of telecommunications sales tax exemption.

4.1. A quantitative estimate of impact of sales tax repeal

4.1.1. Impact of the sales tax repeal on investment

Considering the research literature cited above, as well as the econometric model developed for the country as a whole, it is fair to assume that sales tax exemption on equipment purchasing in Minnesota contributed to an increase in per capita investment at an annual rate of 2.93% between 2006 and 2010 (see Figure 10).

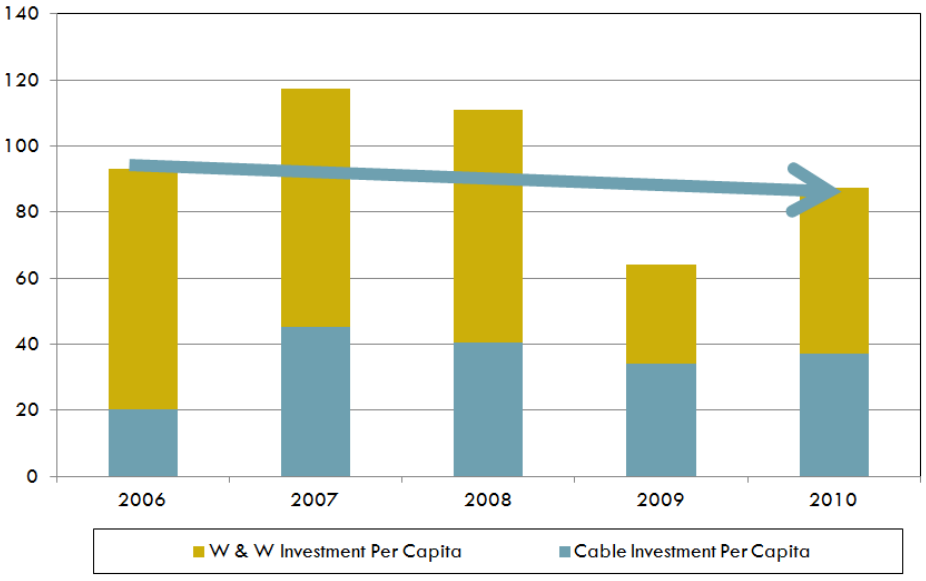
Figure 10. Minnesota: Telecommunications Investment Per Capita (2006-2012)



Source: Broadband Tax Institute Data; Minnesota Cable Communications Association; Minnesota Telecom Alliance; TAS analysis

As a counterfactual, one could analyze what happened in the state of Wisconsin,[14] which had an approximate 5.40% sales tax rate in the same reporting period[15]. The annual growth rate of the investment in the telecommunications sector declined at a rate of 1.57%, as shown in Figure 11.

Figure 11. Wisconsin: Communications Investment Per Capita (2006-2010)



Source: Broadband Tax Institute Data; TAS analysis

[14] Wisconsin could be considered as a state with similar economic profile to Minnesota. It has a population of 5.7 million (Minnesota: 5.3 million); its median income is $ 52,000 (versus $ 57,000 for Minnesota), the number of business establishments amounts to 434,000 (versus 497,000 for Minnesota).
[15] The information for Wisconsin investment is only available from 2006 to 2010.

In light of the inverse correlation between telecommunications equipment sales taxes and investment (as well as the economic impact of telecommunications), it is relevant to consider the impact that the repeal of the telecommunications equipment sales tax will have on telecommunications investment in Minnesota.

By relying on the econometric models presented in Section 2, and using the latest available investment figures from 2012, the analysis estimated the short run and long run impact of the repeal of sales tax exemption in Minnesota.[16] According to the model presented in Section 2, with the repeal of the sales tax exemption, cable TV investment per capita would decrease by $ 3.51 (equivalent to 11.77% under the current level[17] of $29.82). In the case of telecommunications, the decrease in investment would amount to $7.15 per capita (6.57% less than the current level of $108.72). In total, the decrease in investment in Year 1 would amount to $57 million (or a 8.53% decrease of an investment base of $668.61 million[18]).

Furthermore, as indicated in Section 2, the level of investment in Year 2 would be, to a large degree, dependent on the level in Year 1. For example, according to our models, 76.23% 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 64.37%. As a result, the imposition of sales taxes produces not only a short-term but also a long-term effect on investment levels (see table 8).

Table 8. Minnesota: Investment Impact of Repeal of the Sales Tax Exemption (in $ millions)

	Year 1 (2014)	Year 2 (2015)	Total
Investment Decrease	57.32	96.46	153.79
Future estimated Investment (after exemption repeal)	611.29	572.14	1,183.42
Investment focused on equipment (66% of total investment)	407.52	381.42	788.95
State revenue generated for elimination of sales tax exemption (rate: 7.66%)	$ 31.22	$ 29.22	$ 60.44

Source: Broadband Tax Institute; TAS analysis

The projections of table 8 indicate that, as a result of an elimination of the sales tax exemption on initially purchased equipment, in Year 1, the cable TV, wireless, and wireline operators would reduce their investment by $57 million. The second year, the reduction in the level of investment would be higher because the companies would not need to amortize the investment depreciation that did not occur in the previous year. All

[16] The analysis considers only the impact of changes in the level of investment in the telecommunications industry. Therefore, it is assumed that the other economic variables (population, human capital, etc.) are held constant.

[17] For the analysis using the latest information available, corresponding to the amount of investment in 2010.

[18] See planned 2013 investment in table 15, p. 33.

in all, it is estimated that over two years, total revenues to be generated to the state treasury would reach approximately $60.44 and over four years, $113.37 million.

4.1.2. Impact of the sales tax repeal on the economy:

In addition, the reduction in the investment level would impact the economy of the state. The assessment of the direct impact of additional investment on telecommunications construction was conducted by relying on an Input / Output analysis, presented above.[19] Accordingly, a repeal of the sales tax on equipment purchasing by telecommunications companies would trigger a reduction of 3,323 jobs and $308 million in GDP (see details in table 9). This estimate is based on the impact of a short-term investment of $153.8 million (see table 8).

Table 9. Direct Economic Effect of Repealing the Sales Tax Exemption on communication equipment purchasing in Minnesota (2 years)

Investment decline			
Value added reduction (in $ millions except multiplier)	Direct effect	Value added generated in equipment manufacturing, construction and telecoms	$ 78
	Indirect effect	Value-added generated in other industrial sectors	$ 75
	Multiplier	Direct and indirect/Direct	1.96
Employment	Direct effect	Jobs in equipment manufacturing, construction and telecoms	897
	Indirect effect	Jobs in industries supplying to telecom and construction	879
	Induced	Jobs generated in household spending	1,547
	Total		3,323
Total Industry Output (in $ millions, except multiplier)	Direct effect	Investment	$ 153
	Indirect effect	Additional goods generated	$ 155
	Multiplier	(Direct + Indirect) / Direct	2.01

To estimate the impact of the indirect effect generated through externalities, two fixed effects models that assess the impact of telecommunications 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)

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

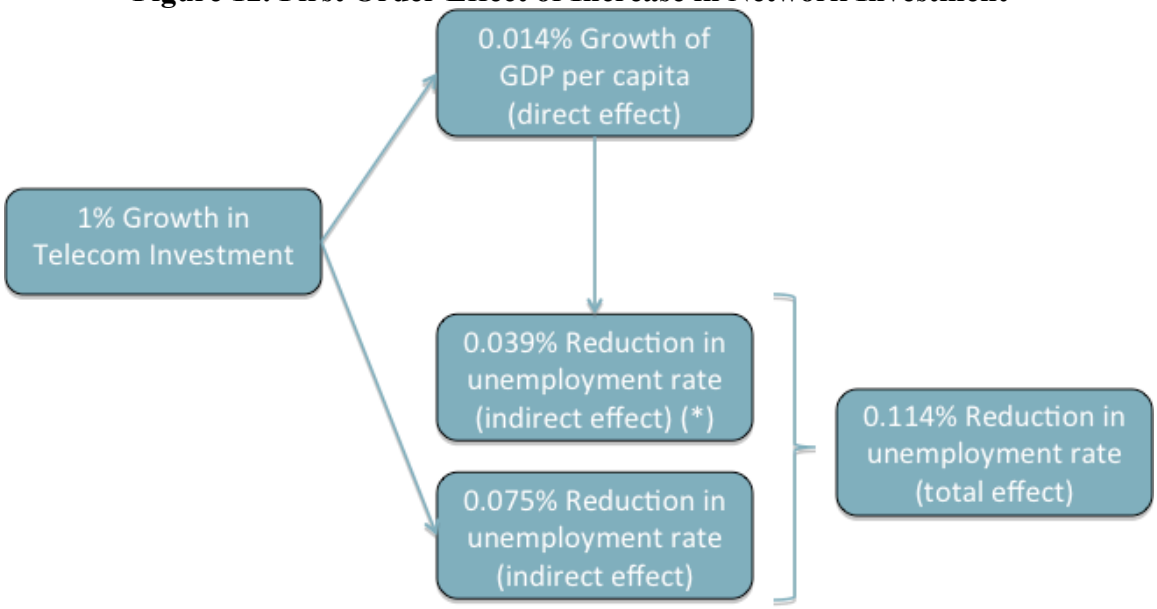
[19] See methodology in appendix B.

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.[20] 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%, the 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 would indirectly create new jobs, which need to be added to the direct employment impact, resulting in a total effect of 1.14% (see figure 12).

Figure 12. 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.

By relying on the econometric models presented above, and based on the decrease in investment in the two years following negative impact of the repeal (presented in table 8), we estimated the indirect effects that this measure would have on state GDP and unemployment (see table 10).

[20] See model results in appendix C.

Table 10. Estimation of Direct and Indirect Socio-Economic impact of eliminating sales tax exemption on telecommunications equipment purchases in Minnesota

Economic Indicators	Current Level	Short Run	Long Run
GDP Per Capita	47,028	46,978	46,894
GDP Per Capita Decrease	-	-0.11%	-0.29%
Reduction in GDP	-	269,138,000	722,087,000
Unemployment Rate	5.13%	5.18%	5.25%
Jobs destroyed	-	1,338	3,589

Source: TAS analysis

The economic analysis based on the models specified shows that eliminating the sales and use tax exemption on communications infrastructure would, over two years, destroy over $722 million in economic activity in Minnesota.[21]

Research on the economic impact of the telecommunications deployment has 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 Minnesota, not just the companies making the investments.

4.2. Survey of expected impact of repeal of tax exemption

As mentioned above, Minnesota has benefitted from the substantial investment made by telecommunications companies. In the last three years alone, communications service providers have invested $ 2,325.92 million in the state (see table 14).

Table 14. Minnesota: Total Telecommunications Investment (2010-2012) (in $ millions)

	2010	2011	2012	Total
Telecommunications	614.15	624.58	576.62	1,815.35
Cable TV	176.62	175.78	158.18	510.57
Total	790.77	800.36	734.80	2,325.92

Source: Minnesota Cable Communications Association; Minnesota Telecom Alliance; Broadband Tax Institute; TAS analysis

Based on a survey of industry players operating in the state, the investment for 2013 will close at an estimated $ 668.61 million, which will raise the total investment between 2010 and 2013 to $ 2,994.53 billion.

[21] This estimate is calculated by multiplying the reduction in the GDP Per Capita of $173 by Minnesota´s population of 5,379,157.

Table 15. Minnesota: Total Telecommunications Investment (2010-2013) (in $ millions)

	2010	2011	2012	2013 E	TOTAL
Telecommunications	614.15	624.58	576.62	516.85	2,332.20
Cable TV	176.62	175.78	158.18	151.76	662.33
Total	790.77	800.36	734.80	668.61	2,994.53

Source: Minnesota Cable Communications Association; Minnesota Telecom Alliance; Broadband Tax Institute; TAS analysis

Of the total investment between 2010 and 2013, 11.6% will be fulfilled by service providers operating in isolated and rural areas, 3.3% by operators serving rural and suburban, and 74% by operators serving the entire state[22]. Based on these figures, it is estimated that approximately 50% of spending is concentrated in rural and suburban areas.

Table 16. Minnesota: Total Telecommunications Investment by Geographic Area (2010-2013)

	Total (in $ million)	Percent
Only Urban	322.13	10.8 %
Only Suburban	9.92	0.3 %
Suburban – Rural	98.00	3.3 %
Only Rural	347.38	11.6 %
All three areas	2,217.09	74.0 %
Total	2,994.53	

Source: Source: Telecom Advisory Services survey

In addition, the average portion of the investment being assigned to broadband services is 56.3%.

These last two statistics – 50% flowing to suburban and rural areas and 56.3% being assigned to broadband - are particularly relevant to a tax policy discussion insofar that a disincentive to investment could have an exceptionally negative impact on the possibility of redressing the digital divide in the state, as well as continuing the deployment of broadband. For example, 40% of survey respondents representing 18.8% of total investment in the last four years responded that the repeal of the telecommunications tax exemption would negatively impact their level of investment in 2014.

The below responses of service providers in regards to a continued scenario of no tax exemption further illustrates this point:

[22] Rural counties were identified using the classification system of the Department of Agriculture for 2003 (Rural-Urban Continuum code). The codes that denote non-metropolitan areas (4-9) were used to identify rural counties. They comprise both rural counties adjacent to metro counties and isolated rural counties.

- "We would re-evaluate the amount of CAPEX we would spend and most likely would reduce our CAPEX spending"
- "This may impact growth strategies"
- "These projects are difficult enough to pay with the exemption on CAPEX. With the cancelling of the sales tax exemption, it makes the projects even more difficult to complete. This cancellation of the sales tax exemption is going to hurt the people in our rural communities. If we can't afford to complete these projects, the people living in the rural areas will not have the option of Broadband"
- "CAPEX probably would have been decreased and new projects given a 2nd review"
- "This would be a significant financial impact that could result in reduced investments and growth"
- "Would have resulted in reduced amount of CAPEX overall in addition to what has already taken place"
- "Our future FTTH/FTTF projects may be scaled back if this tax is expanded"
- "Additional reduction of CAPEX to compensate for increased cost due to sales tax"
- "Likely decrease CAPEX in Minnesota, shift to Dakotas"
- "Investment will likely go to other states"

These answers reiterate several of the effects of tax policy on equipment investment seen in the literature. First, taxes are considered when deciding the investment amount. Per the literature, taxes not only affect a company's incentives to make investments, but they also reduce the supply of funds available to finance these investments. This message consistently emerges in the answers to the question regarding future CAPEX evolution under no equipment tax exemption.

Second, among multi-state service providers, the repeal of the exemption may trigger a shift in investment to neighboring states. Again, as pointed out in the research literature review, while aggregate CAPEX might remain stable, an increase in sales taxes on equipment purchasing would determine the geographic location in which to invest (e.g. a specific state).

Third, as pointed out in the research literature and proven in the econometric analysis of the United States conducted by the authors, 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 purchasing of equipment) might immediately affect the incentives to invest, but only gradually translate to investment decisions. As a result, four carriers consider that the repeal of the tax exemption will start having an impact in 2014.

Finally, as an alternative, carriers were asked what their investment behavior might have been if the exemption had been extended (as recommended by the Task Force) or if it had been extended beyond electronics to include all capital expenditures (see table 17).

Table 17. Investment reaction to potential changes in tax policy (in number of responses)

Continued exemption			Expansion of exemption to include all CAPEX		
No change in investment levels	Increase marginally investment levels	Increase substantially investment levels (>15%)	No change in investment levels	Increase marginally investment levels	Increase substantially investment levels (>20%)
14	7	7	12	3	5

Note: Some answers include two options
Source: Telecom Advisory Services survey

At least 50% of service providers would either marginally or substantially increase their CAPEX if the exemption were to be extended and/or expanded.

5. CONCLUSIONS:

The telecommunications industry has made substantial investments in Minnesota. Between 2006 and 2012, total investment amounted to $ 5.167 billion. This investment contributed to the support of 112,239 jobs/year and generated US$ 10.386 billion in output. In the context of an initially recovering economy, which continues to exhibit significant duality between urban and rural locations, any policy initiative that has the potential to alter the rate of communications investment could have detrimental effects. This paper has examined the effects of repealing the sales tax exemption on telecommunications equipment purchasing.

According to our models, the repeal of the sales tax exemption would trigger a $ 3.51 decrease in per capita cable TV investment (equivalent to 11.77% under the current level[23] of $29.82) and a $7.15 per capita decrease in telecommunications investment (6.57% less than the current level of $108.72). In total, the decrease in investment would amount to $57 million (or a 8.53% decrease of an investment base of $668.61 million) and $ 96 million in Year 2.

Given the short term multiplying impact resulting from network deployment, a $ 153 million reduction in spending over two years would trigger a reduction of 3,323 jobs and $308 million in GDP. Beyond this direct effect, econometric modeling indicates that eliminating the sales and use tax exemption on communications infrastructure would – in just two years – indirectly destroy over $722 million in economic activity.

[23] For the analysis using the latest information available, corresponding to the amount of investment in 2010.

Finally, a survey conducted across communications companies operating in the state (which generated 37 responses) indicated that 40 % would reduce their investment in 2014 under the current tax policy. Alternatively, at least 50 % of service providers would either marginally or substantially increase their CAPEX if the repeal were to be extended and/or expanded.

In sum, the repeal of the sales and use tax exemption on "telecommunications" capital equipment is detrimental to the economy of Minnesota. Consistent with the recommendations of the Governor's Broadband Task Force, the repeal should be reconsidered to allow communications service providers to continue playing a critical role in the economic recovery of the state.

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APPENDICES

Appendix A. MSA Chapter 297A.68 Subdivision 35 repealer

CHAPTER 143--H.F.No. 677

An act relating to financing and operation of state and local government; making changes to individual income, corporate franchise, property, sales and use, estate, mineral, tobacco, alcohol, special, local, and other taxes and tax-related provisions modifying the property tax refund; changing property tax aids and credits; modifying the Sustainable Forest Incentive Act; modifying education aids and levies; providing additional pension funding; modifying definitions and distributions for property taxes; providing for property tax exemptions; modifying the payment in lieu of tax provisions; modifying education aids and levies; modifying tobacco tax provisions; making changes to additions and subtractions from federal taxable income; providing for federal conformity; changing income tax rates for individuals, estates, and trusts; providing income tax credits; modifying estate tax provisions; providing for a state gift tax; expanding the sales tax base; modifying the duty to collect and remit sales taxes for certain sellers; imposing the sales tax on digital products and selected services; modifying the definition of sale and purchase; modifying provisions for the rental motor vehicle tax rate; providing for multiple points of use certificates; modifying sales tax exemptions; authorizing local sales taxes; authorizing economic development powers; modifying tax increment financing rules; providing authority, organization, powers, duties, and requiring a prevailing wage for development of a Destination Medical Center; authorizing state infrastructure aid; modifying the distribution of taconite production taxes; authorizing taconite production tax bonds for grants to school districts; modifying and providing provisions for public finance; providing funding for legislative office facilities; modifying the definition of market value for tax, debt, and other purposes; making conforming, policy, and technical changes to tax provisions; requiring studies and reports; appropriating money;amending Minnesota Statutes 2012, sections 13.792; 16A.46; 16A.727; 38.18; 40A.15, subdivision 2; 69.011, subdivision 1; 69.021, subdivisions 7, 8; 88.51, subdivision 3; 103B.102, subdivision 3; 103B.245, subdivision 3; 103B.251, subdivision 8; 103B.335; 103B.3369, subdivision 5; 103B.635, subdivision 2; 103B.691, subdivision 2; 103C.501, subdivision 4; 103D.905, subdivisions 2, 3, 8; 103F.405, subdivision 1; 116J.8737, subdivisions 1, 2, 8; 117.025, subdivision 7; 118A.04, subdivision 3; 118A.05, subdivision 5; 123A.455, subdivision 1; 126C.10, subdivision 1, by adding a subdivision; 126C.13, subdivision 4; 126C.17; 126C.48, subdivision 8; 127A.48, subdivision 1; 138.053; 144F.01, subdivision 4; 162.07, subdivisions 3, 4; 163.04, subdivision 3; 163.06, subdivision 6; 165.10, subdivision 1; 168.012, subdivision 9, by adding a subdivision; 216C.436, subdivision 7; 237.52, subdivision 3, by adding a subdivision; 270.077; 270.41, subdivisions 3, 5, by adding a subdivision; 270.45; 270B.01, subdivision 8; 270B.03, subdivision 1; 270B.12, subdivision 4; 270C.03, subdivision 1; 270C.34, subdivision 1; 270C.38, subdivision 1;

270C.42, subdivision 2; 270C.56, subdivision 1; 271.06, subdivision 2a, as added; 272.01, subdivision 2; 272.02, subdivisions 39, 97, by adding subdivisions; 272.03, subdivision 9, by adding subdivisions; 273.032; 273.061, subdivision 2; 273.0645; 273.11, subdivision 1; 273.114, subdivision 6; 273.117; 273.124, subdivisions 3a, 13; 273.13, subdivisions 21b, 23, 25; 273.1398, subdivisions 3, 4; 273.19, subdivision 1; 273.372, subdivision 4; 273.39; 275.011, subdivision 1; 275.077, subdivision 2; 275.71, subdivision 4; 276.04, subdivision 2; 276A.01, subdivisions 10, 12, 13, 15; 276A.06, subdivision 10; 279.01, subdivision 1, by adding a subdivision; 279.02; 279.06, subdivision 1; 279.37, subdivisions 1a, 2; 281.14; 281.17; 287.05, by adding a subdivision; 287.08; 287.20, by adding a subdivision; 287.23, subdivision 1; 287.385, subdivision 7; 289A.08, subdivision 3; 289A.10, subdivision 1, by adding a subdivision; 289A.12, subdivision 14, by adding a subdivision; 289A.18, by adding a subdivision; 289A.20, subdivisions 3, 4, by adding a subdivision; 289A.26, subdivisions 3, 4, 7, 9; 289A.55, subdivision 9; 289A.60, subdivision 4; 290.01, subdivisions 19, as amended, 19b, 19c, 19d; 290.06, subdivisions 2c, 2d, by adding a subdivision; 290.0677, subdivision 2; 290.068, subdivisions 3, 6a; 290.0681, subdivisions 1, 3, 4, 5, 10; 290.091, subdivisions 1, 2, 6; 290.0921, subdivision 3; 290.0922, subdivision 1; 290.095, subdivision 2; 290.10, subdivision 1; 290.17, subdivision 4; 290.191, subdivision 5; 290.21, subdivision 4; 290.9705, subdivision 1; 290A.03, subdivision 3; 290A.04, subdivisions 2, 2a, 4; 290B.04, subdivision 2; 290C.02, subdivision 6; 290C.03; 290C.055; 290C.07; 291.005, subdivision 1; 291.03, subdivisions 1, 8, 9, 10, 11, by adding a subdivision; 296A.01, subdivisions 7, 8, 14, 19, 20, 23, 24, 26, by adding a subdivision; 296A.09, subdivision 2; 296A.17, subdivision 3; 296A.22, subdivisions 1, 3; 297A.61, subdivisions 3, 4, 10, 25, 38, 45, by adding subdivisions; 297A.64, subdivision 1; 297A.66, subdivision 3, by adding a subdivision; 297A.665; 297A.668, by adding a subdivision; 297A.67, subdivisions 7, 13, by adding a subdivision; 297A.68, subdivisions 2, 5, 42, by adding a subdivision; 297A.70, subdivisions 2, 4, 5, 7, 13, 14, by adding subdivisions; 297A.71, by adding subdivisions; 297A.75, subdivisions 1, 2, 3; 297A.82, subdivision 4, by adding a subdivision; 297A.99, subdivision 1; 297B.11; 297E.021, subdivision 3; 297E.14, subdivision 7; 297F.01, subdivisions 3, 19, 23, by adding subdivisions; 297F.05, subdivisions 1, 3, 4, by adding subdivisions; 297F.09, subdivision 9; 297F.18, subdivision 7; 297F.24, subdivision 1; 297F.25, subdivision 1; 297G.04, subdivision 2; 297G.09, subdivision 8; 297G.17, subdivision 7; 297I.05, subdivisions 7, 11, 12; 297I.30, subdivisions 1, 2; 297I.80, subdivision 1; 298.01, subdivisions 3, 3b; 298.018; 298.17; 298.227, as amended; 298.24, subdivision 1; 298.28, subdivisions 4, 6, 9c, 10; 325D.32, subdivision 2; 325F.781, subdivision 1; 349.166, subdivision 1; 353G.08, subdivision 2; 360.531; 360.66; 365.025, subdivision 4; 366.095, subdivision 1; 366.27; 368.01, subdivision 23; 368.47; 370.01; 373.01, subdivisions 1, 3; 373.40, subdivisions 1, 2, 4; 375.167, subdivision 1; 375.18, subdivision 3; 375.555; 383A.80, subdivision 4; 383B.152; 383B.245; 383B.73, subdivision 1; 383B.80, subdivision 4; 383D.41, by adding a subdivision; 383E.20; 383E.23; 385.31; 394.36, subdivision 1; 398A.04, subdivision 8;

401.05, subdivision 3; 403.02, subdivision 21, by adding subdivisions; 403.06, subdivision 1a; 403.11, subdivision 1, by adding subdivisions; 410.32; 412.221, subdivision 2; 412.301; 428A.02, subdivision 1; 428A.101; 428A.21; 430.102, subdivision 2; 447.10; 450.19; 450.25; 458A.10; 458A.31, subdivision 1; 465.04; 469.033, subdivision 6; 469.034, subdivision 2; 469.053, subdivisions 4, 4a, 6; 469.071, subdivision 5; 469.107, subdivision 1; 469.169, by adding a subdivision; 469.176, subdivisions 4c, 4g, 6; 469.177, subdivisions 1a, 9, by adding subdivisions; 469.180, subdivision 2; 469.187; 469.206; 469.319, subdivision 4; 469.340, subdivision 4; 471.24; 471.571, subdivisions 1, 2; 471.73; 473.325, subdivision 2; 473.39, by adding a subdivision; 473.606, subdivision 3; 473.629; 473.661, subdivision 3; 473.667, subdivision 9; 473.671; 473.711, subdivision 2a; 473F.02, subdivisions 12, 14, 15, 23; 473F.08, subdivisions 3a, 10, by adding a subdivision; 474A.04, subdivision 1a; 474A.062; 474A.091, subdivision 3a; 475.521, subdivisions 1, 2, 4; 475.53, subdivisions 1, 3, 4; 475.58, subdivisions 2, 3b; 475.73, subdivision 1; 477A.011, subdivisions 20, 30, 34, 42, by adding subdivisions; 477A.0124, subdivision 2; 477A.013, subdivisions 1, 8, 9, by adding a subdivision; 477A.015; 477A.03, subdivisions 2a, 2b, by adding a subdivision; 477A.11, subdivisions 3, 4, by adding subdivisions; 477A.12, subdivisions 1, 2, 3; 477A.14, subdivision 1, by adding a subdivision; 641.23; 641.24; 645.44, by adding a subdivision; Laws 1971, chapter 773, section 1, subdivision 2, as amended; Laws 1988, chapter 645, section 3, as amended; Laws 1993, chapter 375, article 9, section 46, subdivisions 2, as amended, 5, as amended; Laws 1998, chapter 389, article 8, section 43, subdivisions 1, 3, as amended, 5, as amended; Laws 1999, chapter 243, article 6, section 11; Laws 2002, chapter 377, article 3, section 25, as amended; Laws 2005, First Special Session chapter 3, article 5, section 37, subdivisions 2, 4; Laws 2006, chapter 259, article 11, section 3, as amended; Laws 2008, chapter 366, article 5, sections 26; 33; 34, as amended; article 7, section 19, subdivision 3, as amended; Laws 2009, chapter 88, article 2, section 46, subdivisions 1, 3; Laws 2010, chapter 216, sections 11; 55; Laws 2010, chapter 389, article 1, section 12; article 5, section 6, subdivision 6; proposing coding for new law in Minnesota Statutes, chapters 116J; 116V; 124D; 136A; 270C; 287; 290A; 292; 403; 423A; 469; 477A; repealing Minnesota Statutes 2012, sections 16A.725; 97A.061; 256.9658; 272.69; 273.11, subdivisions 1a, 22; 276A.01, subdivision 11; 289A.60, subdivision 31; 290.01, subdivision 6b; 290.06, subdivision 22a; 290.0921, subdivision 7; 290.171; 290.173; 290.174; 297A.61, subdivision 27; *297A.68, subdivision 35*; 473F.02, subdivision 13; 477A.011, subdivisions 2a, 19, 21, 29, 31, 32, 33, 36, 39, 40, 41; 477A.013, subdivisions 11, 12; 477A.0133; 477A.0134; Laws 1973, chapter 567, section 7, as amended; Laws 2009, chapter 88, article 4, section 23, as amended.

Sec. 53. **REPEALER.**

(a) Minnesota Statutes 2012, sections 297A.61, subdivision 27; and 297A.68, subdivision 35, are repealed.

(b) Laws 2009, chapter 88, article 4, section 23, as amended by Laws 2010,

chapter 389, article 5, section 4, is repealed.

EFFECTIVE DATE. Paragraph (a) is effective for sales and purchases made after June 30, 2013. Paragraph (b) is effective the day following final enactment.

Subd. 35.**Telecommunications, cable television, and direct satellite machinery and equipment.**

(a) Telecommunications, cable television, or direct satellite machinery and equipment purchased or leased for use directly by a telecommunications, cable television, or direct satellite service provider primarily in the provision of telecommunications, cable television, or direct satellite services that are ultimately to be sold at retail are exempt, regardless of whether purchased by the owner, a contractor, or a subcontractor.

(b) For purposes of this subdivision, "telecommunications, cable television, or direct satellite machinery and equipment" includes, but is not limited to:

(1) machinery, equipment, and fixtures utilized in receiving, initiating, amplifying, processing, transmitting, retransmitting, recording, switching, or monitoring telecommunications, cable television, or direct satellite services, such as computers, transformers, amplifiers, routers, bridges, repeaters, multiplexers, and other items performing comparable functions;

(2) machinery, equipment, and fixtures used in the transportation of telecommunications, cable television, or direct satellite services, radio transmitters and receivers, satellite equipment, microwave equipment, and other transporting media, but not wire, cable, fiber, poles, or conduit;

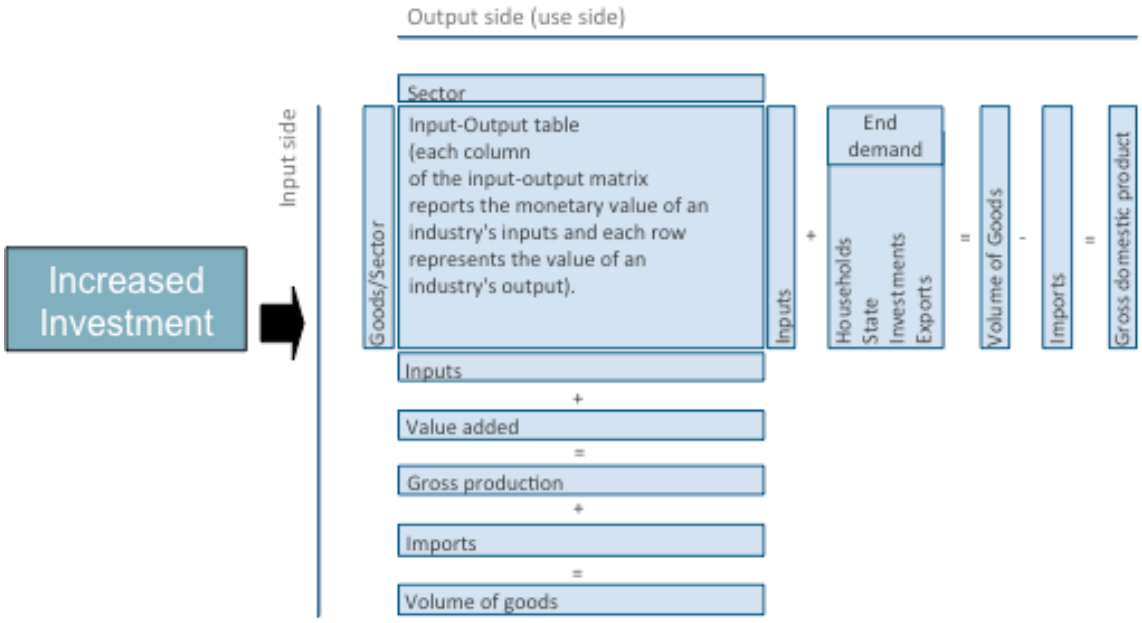
(3) ancillary machinery, equipment, and fixtures that regulate, control, protect, or enable the machinery in clauses (1) and (2) to accomplish its intended function, such as auxiliary power supply, test equipment, towers, heating, ventilating, and air conditioning equipment necessary to the operation of the telecommunications, cable television, or direct satellite equipment; and software necessary to the operation of the telecommunications, cable television, or direct satellite equipment; and

(4) repair and replacement parts, including accessories, whether purchased as spare parts, repair parts, or as upgrades or modifications to qualified machinery or equipment.

Appendix B. 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 with A = 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 C. Economic Impact Model of Sales tax repeal

MINNESOTA DATA			
Sales Tax Rate Cable 2012	0.00%	CABLE INV 2012	$ 29.82
Sales Tax Rate W & W 2012	0.00%	W & W INV 2012	$ 108.72
New Sales Tax Rate Cable	7.66%		
New Sales Tax Rate W & W	7.66%		
Impact Cable Investment	$ -3.51	-11.77%	
Impact W & W Investment	$ -7.15	-6.57%	
New Cable Investment	$ 26.31		
New W & W Investment	$ 101.57		
Population	5,379,157		
Total Cable Investment	$ 141,527,081		
Total W & W Investment	$ 546,377,193		
Total OLD Cable Invest	$ 160,406,462		
Total OLD W&W Invest	$ 584,821,949		
Total New Investment	$ 687,904,274		
Total Old Investment	$ 745,228,411		
Investment Decrease Year 1	$ -57,324,137		
Growth Investment	-7.69%		
Total Invest P C OLD	138.54	TOTAL	
Year 1 Cable	$ -18,879,381	$ -18,879,381	
Year 1 W & W	$ -38,444,756	$ -38,444,756	
Year 2 Cable	$ -14,391,593	$ -33,270,974	
Year 2 W & W	$ -24,758,423	$ -63,203,179	

2013 Est. Investment	$ 668,610,000

Impact of Repeal of the sales Tax Rate (Base on 2013E investment)						
	FY 2014	FY 2015	FY 2016	FY 2017	Total (2 years)	Total (4 years)
Investment Decrease	$ -57,324,137	$ -96,474,153	$ -133,116,792	$ -167,412,641	$ -153,798,289	$ -454,327,723
Total Investment	$ 611,285,863	$ 572,135,847	$ 535,493,208	$ 501,197,359	$ 1,183,421,711	$ 2,220,112,277
Investment Tax	$ 407,523,905	$ 381,423,894	$ 356,995,468	$ 334,131,569	$ 788,947,799	$ 1,480,074,836
Tax	$ 31,216,331	$ 29,217,070	$ 27,345,853	$ 25,594,478	$ 60,433,401	$ 113,373,732
Change	-8.57%	-14.43%	-19.91%	-25.04%	-23.00%	-67.95%

SOCIOECONOMIC IMPACT (Base on 2013E investment)				
Economic Indicators	Current Level	Short Run	Year 2	Long Run (Total)
GDP Per Capita	$ 47,028	$ 46,972	$ 46,934	$ 46,878
GDP Per Capita Growth	0.00%	-0.12%	-0.20%	-0.32%
Incremental GDP	$ 0	$ -299,979,865	$ -504,853,715	$ -804,833,580
Unemployment Rate	5.13%	5.18%	5.20%	5.26%
Employment Gained	0	-1,491	-2,161	-4,000

SOCIOECONOMIC VARIABLES			
Population	5,379,157	Sales Tax Rate	7.66%
GDP Capita	$ 47,028	Labor Force	2,970,779
Unemployment Rate	5.13%	Unemployment	152,473

Impact of Repeal of the sales Tax Rate (Base on 2012 Investment)						
	FY 2014	FY 2015	FY 2016	FY 2017	Total (2 years)	Total (4 years)
Investment Decrease	$ -57,324,137	$ -96,474,153	$ -133,396,063	$ -168,216,672	$ -153,798,289	$ -455,411,024
Total Investment	$ 687,904,274	$ 648,754,258	$ 611,832,348	$ 577,011,738	$ 1,336,658,532	$ 2,525,502,619
Investment Tax	$ 458,602,845	$ 432,502,834	$ 407,888,228	$ 384,674,488	$ 891,105,679	$ 1,683,668,396
Tax	$ 35,128,978	$ 33,129,717	$ 31,244,238	$ 29,466,066	$ 68,258,695	$ 128,968,999
Change	-7.69%	-12.95%	-17.90%	-22.57%	-20.64%	-61.11%

SOCIOECONOMIC IMPACT (Base on 2012 Investment)				
Economic Indicators	Current Level	Short Run	Year 2	Long Run (Total)
GDP Per Capita	$ 47,028	$ 46,978	$ 46,944	$ 46,894
GDP Per Capita Growth	0.00%	-0.11%	-0.18%	-0.29%
Incremental GDP	$ 0	$ -269,138,340	$ -452,948,703	$ -722,087,043
Unemployment Rate	5.13%	5.18%	5.20%	5.25%
Employment Gained	0	-1,338	-1,939	-3,589

Appendix D. Alternative Model: Economic Impact of Sales Tax Rate

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: Katz, Flores and Callorda (2012)